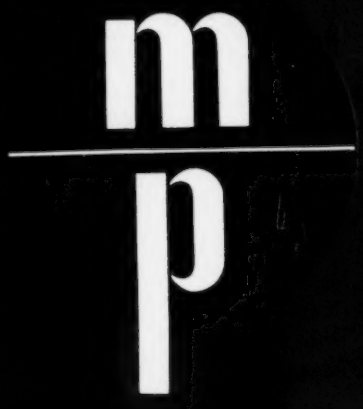
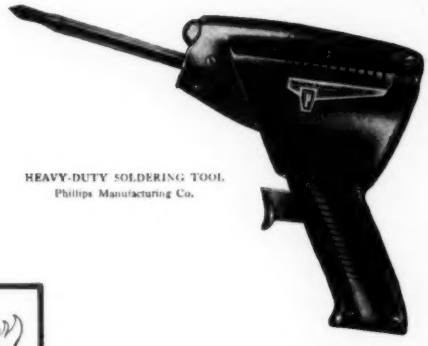
MODERN PLASTICS



DECEMBER 1951

HEAT needn't cool off ideas for better products

HOT POPCORN
DISPENSER BASE
Buddy Boy Popcorn Co.



HEAVY-DUTY SOLDERING TOOL
Phillips Manufacturing Co.

ARVIN ELECTRIC IRON
Noblitt-Sparks Industries, Inc.

AUTOMATIC VAPORIZER
Practical Electric Products Co.

. . . just ask your molder about DUREZ phenolics

● Where heat conditions are involved, first thoughts on plastics in product planning sessions are naturally concentrated on the phenolics. These alone of all plastics are generally heat-stable up to 300°F., and in heat-resistant grades up to 400°F. and higher.

As specialists in developing phenolics to meet unusual as well as common requirements, Durez has carried heat resistance well beyond the limits of recent years. Recurrent temperatures in the area of 500°F. are being met by mineral-filled Durez compounds with no loss of dimensional stability, strength, luster and other desired properties.

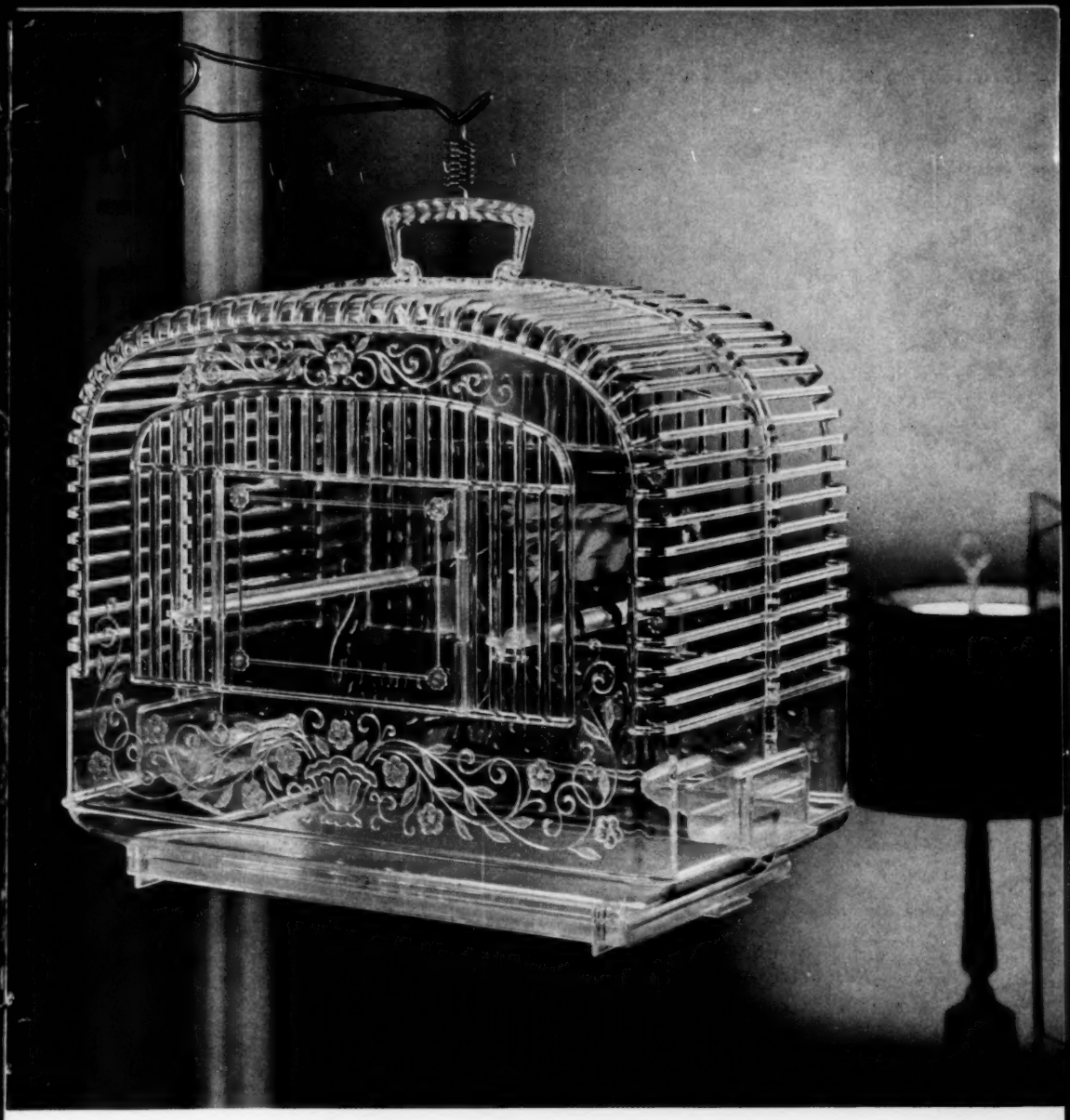
The Durez in the vaporizer illustrated is impervious to mild solvents, hot or cold. The 15″ x 12″ x 5″ popcorn warmer base is warp-free. The iron handle never burns the ironer's hand. The soldering tool is safe and comfortable to use.

Whatever the product, your custom molder can help you see how heat resistance and other unusual properties of Durez can be used to advantage—in time and money.

Our field engineers are always ready with technical assistance.

Our monthly "Durez Plastics News" will keep you informed on industry's uses of Durez. Write, on office letterhead, to Durez Plastics & Chemicals, Inc., 1212 Walck Road, North Tonawanda, N. Y.

PHENOLIC PLASTICS THAT FIT THE JOB



From Gilded Cage to Crystal Palace

A spectacular transition resplendent in the beauty of... *Catalin* **STYRENE**

The feathered occupant's happy pose, the color photographer's art, the engraver's skill and the written word . . . all four combine on this page to portray the exquisite, dramatically designed Beco* Bird Cage — And yet, to fully appreciate why this product achievement was awarded the famed Fashion Academy Gold Medal, one must actually see it! It's indescribably beautiful!

The delicately engraved sturdy frame, with its vertical and horizontal lattice-work, is a tribute to imaginative plastics engineering. This gracefully styled enclosure, together with its hinged door, the perches, swing, treat cups, safety covers, drawer-type tray and arched handle are all molded of CATALIN STYRENE, the *one* plastic that does justice to the genius of the undertaking!

Low cost, lightweight CATALIN STYRENE is so capable of serving so many of the products of American enterprise, that the Catalin Service Staff invites the opportunity to detail this plastic's versatility.

CATALIN CORPORATION OF AMERICA
ONE PARK AVENUE • NEW YORK 16, N. Y.

**Product of Bernard Edward Company, Chicago, Ill.*

MODERN PLASTICS*

VOLUME 29 DECEMBER 1951 NUMBER 4

CONTENTS

Modern Plastics, published monthly by Modern Plastics, Inc., at Emmett St., Bristol, Conn. Executive and Editorial Office: 575 Madison Ave., New York 22, N. Y. Published each month by Modern Plastics, Inc. Entered as second class matter at the Post Office at Bristol, Conn., December 14, 1950, under the act of March 3, 1879. Subscription $5.00 a year, $8.00 for two years in the U.S., its possessions, and South America. Canadian subscription $5.00 a year, $8.00 for two years. All other countries $5.00 a year, $8.00 for two years, payable in U.S. currency. Price of this issue 75 cents per copy. Printed in the U.S.A. by the Hildreth Press, Inc., Bristol, Conn.

* Reg. U.S. Pat. Office

Another development using

B. F. Goodrich Chemical Company *raw materials*

B. F. Goodrich Chemical Company does not make this decorative sheeting. We supply raw materials only.

CHRISTMAS IDEA that's good all year!

THIS fast-selling Christmas idea developed by a manufacturer can be equally well adapted to commercial uses with the same good results! Polished sheets made of Geon are die-cut into holly and other Christmas shapes for home decoration. These colorful shapes stick to porcelain, glass and other smooth surfaces. The trick is that they can be removed at will, washed and used over and over again, without leaving marks on the surface.

This same idea can be used in display work in stores or other uses where Geon's advantages fill the bill!

Just think—Geon materials resist heat and cold, water, weather and wear. They're not affected by gas, oil, many chemicals and other damaging elements. Geon "takes" any color well—as brilliant or as delicate as desired.

Geon materials come in many forms, including resin, latex and compounded plastics. For helpful technical bulletins and advice, please write Dept. GA-12, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario. Cable address: Goodchemco.

GEON RESINS • GOOD-RITE PLASTICIZERS...the ideal team to make products easier, better and more saleable.

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON organic colors

Plenty of tough problems are solved with EXTRA STRENGTH PLASTICS

Do you have a plastics application where strength is a requirement? Then you should investigate the advantages of modern extra strength plastics. These materials, combined with various types of fillers, can be molded to withstand stress, strain and impact to a remarkable degree. Furthermore, these materials are light weight. Many are resistant to various oils and chemicals and have excellent heat and electrical insulation characteristics.

Be sure to get the right material. Not all of these qualities are available in any one material but the experienced molder knows just what material or combination of material and filler will best meet your requirements. That's why it's important that you select a source like Chicago Molded. For here you will find a rare combination of know-how and facilities backed by more than 30 years experience in plastics . . . a combination that insures successful results right from the start.

We mold ALL plastic materials. And we have the most modern facilities for all three methods of molding . . . compression, injection and transfer. So . . . whatever your job may call for, our recommendations will be unbiased. We are only concerned with producing the best possible results for you. No doubt that is one of the reasons why 60% of our business comes from firms we have served for 15 years or more.

You'll find it time well spent to discuss your next molded plastics job with a Chicago Molded engineer There's no obligation. Just write, wire or phone.

CHICAGO MOLDED
PRODUCTS CORPORATION
1046 North Kolmar Avenue, Chicago 51, Illinois

Ask for your copy of this booklet

It's packed with interesting factual information about plastics, their characteristics, applications, and methods of molding them. Write for your copy today, on your company letterhead, please.

This Warner Electric Brake Plug is molded of high impact canvas filled phenolic. It's light in weight with extra impact strength and good electrical insulation.

A high impact phenolic with macerated canvas filler gives this Sunbeam Hedge Trimmer handle extra strength with excellent electrical and heat insulation and light weight.

This spinner for the Zebco Casting Reel is molded of a melamine-formaldehyde material with cotton cloth filler. It's light in weight with high flexural strength to withstand pull, and excellent water resistance.

This massive Halliburton Oil Well Valve Seat is of high impact phenolic filled with macerated canvas. It has the strength to resist tremendous pressure, yet is easily drilled out when job is completed.

CHICAGO MOLDED PLASTICS

CUSTOM MOLDERS OF ALL PLASTIC MATERIALS

EDITORIAL

The Fifth National Plastics Exposition

As we go to press, we are informed that display space at the Fifth National Plastics Exposition was sold out as of October 1st. Added space for 19 booths was then made available, and this too has been sold. There are over 130 exhibitors listed.

These figures speak well for the present condition of the industry and for its outlook. The announced expansion plans of the plastics materials manufacturers, the recorded expansion of facilities of molders, extruders, calenderers, laminators, fabricators, and other processors, and the sales development programs of all parts of the industry form the background of this remarkable piece of exhibition space selling.

It all means that the Fifth National Plastics Exposition should be tremendous, in every respect.

In the two years since the last plastics show, so many developments have taken place in materials, equipment, methods, and markets that the fifth show may well be largely devoted to these new factors.

The balance of emphasis between military applications and civilian uses will be interesting to observe, because the pattern of this balance is, to date, anything but clear. Since plastics are today of much more strategic importance than at any time during World War II, the military significance of this show should be considerable. But many of the military applications will necessarily be classified and therefore not available for display, while in many cases new military applications may not have been stabilized in design to the point where quantity procurement is in order. It is hoped that a change in this picture will take place within the next three months so that the 1952 Plasics Exposition may truly present a complete picture of the part plastics are playing in the present defense program.

It is also important that the significance of the developments over the past two years in civilian uses of plastics be registered in no uncertain fashion.

But quite as important as either of the above factors is the careful presentation of possibilities and probabilities of plastics in future applications.

The pace of expansion of raw material production at present will obviously give this industry fabulous new quantities of plastics within the next two years. With due consideration for the amounts that will be needed in defense, and unless we become involved in a full-scale war, this industry will face a terrific challenge in finding new markets for plastics and in expanding present markets.

We believe that the Fifth National Plastics Exposition will be the perfect place and time for this industry to express its most pragmatic product dreams to industry, to the distributive trades, to the military, and to the consumers. We believe that this timing will be enhanced by the fact that metals and certain other materials will be in very restricted supply by March of next year. We believe that endorsement by the Armed Forces of new plastics applications, after severe testing, will help to effect consumer approval. We believe that the whole public relations interpretation of industry emphasis on expanded application possibilities reflects the aggressive policies that have always been characteristic of this industry.

President and Publisher

CHARLES A. BRESKIN

Editorial Staff

Editor: HIRAM MCCANN
Technical Editor: DR. GORDON M. KLINE
Engineering Editor: FRED B. STANLEY
Senior Editor: R. L. VAN BOSKIRK
Managing Editor: A. PAUL PECK
Art Director: DONALD R. RUTHER
Associate Editor: WARREN H. GOODMAN
Assistant Editor: JOAN MOISSEIFF
Midwestern Editor: VAL WRIGHT
Readers Service: PAUL P. PHILIPSON

Business Staff

Vice President and General Manager: ALAN S. COLE

P. H. Backstrom — B. W. Gussow
M. A. Olsen — W. F. Kennedy
J. M. Connors — J. C. Galloway
R. C. Beggs — S. S. Siegel

Promotion Manager: PHILIP W. MULLER
Production Manager: DANIEL M. BROADS
Asst. Production Manager: B. J. FARINA
Production: SEYMOUR SCHWARTZ
Asst. to Publisher: THEODORE B. BRESKIN

Circulation Department

Circulation Manager: FREDERICK A. KLEIN

Executive and Editorial Offices

575 Madison Ave., New York 22, N. Y.
Tel., PLaza 9-2710

Branch Offices

Chicago 11: 101 E. Ontario St.
J. M. Connors Tel., Delaware 7-0060

Cleveland 14: 815 Superior Ave.
R. C. Beggs Tel., SUperior 1-0737

Los Angeles 17: 816 West Fifth St.
J. C. Galloway Tel., Mutual 8335

England: 10/12 Broad St. Ave., Blomfield St., London, E. C. 2
L. H. Dolaro Tel., London Wall 4231

Member Audit Bureau of Circulations
MODERN PLASTICS is regularly indexed in Industrial Arts Index and Industex.

THIS GIANT FILTER PLATE

"couldn't be made satisfactorily"

but...

RICHARDSON is molding it from a NEW Corrosion-Resistant Plastic —developed in the RICHARDSON LABORATORIES

● Sparkler Manufacturing Company, Mundelein, Illinois, faced a tough material problem in designing this 33-inch filter plate weighing 24 pounds for their filtering unit. The filter plate had to withstand the corrosive action of a variety of hot solutions — ranging from weak to strong acids and alkalies. Furthermore, the material had to be strong and non-sagging, with good dimensional stability.

Richardson plastics engineers were called in to help because of their wide experience in material development and part design, and because Richardson molding facilities are unmatched in the industry. Richardson developed a new corrosion and heat-resisting plastics material for the job, and precision-molded the part to Sparkler's exact requirements.

Write for illustrated INSUROK Folder

Consult Richardson on Your Special Plastics Jobs

The Sparkler application is typical of hundreds in which Richardson engineers have solved difficult plastics problems for industry. The Richardson Company's unique 4-point plastics service—Materials Development, Engineering, Molding, and Laminating — are available for your benefit.

The RICHARDSON COMPANY

FOUNDED 1858 — LOCKLAND, OHIO

2789 Lake St., Melrose Park, Illinois (Chicago District)

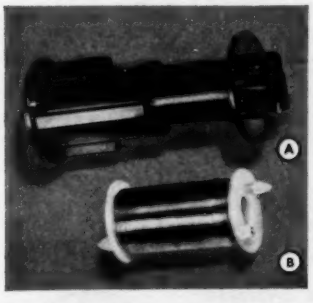
INSUROK
Laminated and Molded Plastics

MELROSE PARK, ILL. INDIANAPOLIS, IND. NEW BRUNSWICK, N. J. NEWNAN, GA. TYLER, TEX. OGDEN, UTAH

NYLON PLASTIC GATE HOUSING BUILT TO LOOK LIFELIKE . . . LAST A LIFETIME

Lionel gets realistic detail, outstanding durability, and heat-resistance in gate housing and other parts molded of Du Pont nylon

If you have ever seen the Lionel model railroad trains and accessories, you know why they are justly famous for toughness and detailed accuracy. So, when Lionel designed this realistic crossing gate, they used Du Pont nylon plastic for the housing, which encloses the electrically operated mechanism and a 10-watt light bulb. Nylon withstands continuous heat up to 250°F.—more than is encountered in normal use, enough to insure satisfactory performance under extreme emergency conditions. Furthermore, durable nylon easily withstands the rough treatment that this toy is bound to receive. And nylon is readily molded to accurate detail . . . even to the tiny bolt heads which add realism.



(A) CONCENTRIC SPLINE SHAFTS used in new Lionel transformer. Typical of new designs in which Lionel has used a nylon part to replace numerous combined parts made of other materials.

(B) COIL FORM (inside gate housing) resists continuous heat up to 250°F. Molded in extremely thin sections, it will not break in winding operation . . . serves as its own bearing. One of many coil forms used in Lionel equipment.

Lionel uses nylon in many other parts —some for nylon's strength in thin and intricate sections . . . some for nylon's electrical insulating properties . . . some, like the above part, for nylon's superior heat-resistance.

Why not investigate molded nylon parts for improving your product and its production? For additional information on nylon and other Du Pont plastics write:

E. I. du Pont de Nemours & Company (Inc.)
Polychemicals Department, District Offices:
350 Fifth Avenue, New York 1, New York
7 S. Dearborn St., Chicago 3, Illinois
845 E. 60th St., Los Angeles 1, California

DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY
Polychemicals
DEPARTMENT
PLASTICS • CHEMICALS

The ERIE *finishing touch*

View showing a few of a large battery of spray booths for painting smaller pieces

Plating is done with the most up-to-date equipment, some of which is shown in this photograph

A corner of the painting department showing spray booths in which television windows and other large pieces are painted

A group of busy workers in a section of the hot stamping and foiling department

- **PLATING**
- **PAINTING**
- **FOILING**

. . . TRANSFORM YOUR CUSTOM INJECTION MOLDED PRODUCTS INTO PIECES OF RARE BEAUTY

THE difference between an ordinary, run-of-mine plastic product and an article of startling beauty is often in the finishing. In its recently expanded facilities ERIE has spared no pains or expense to provide the finest in equipment for every type of finishing and decorating and to put it in charge of expertly trained personnel.

Over thirty painting booths provide for economical production on the smallest or largest pieces. Hot pressing and foiling and plating departments provide rich metallic finishes. Paint is combined with the metallic finish in sparkling "three dimensional" plastic gems of enduring beauty.

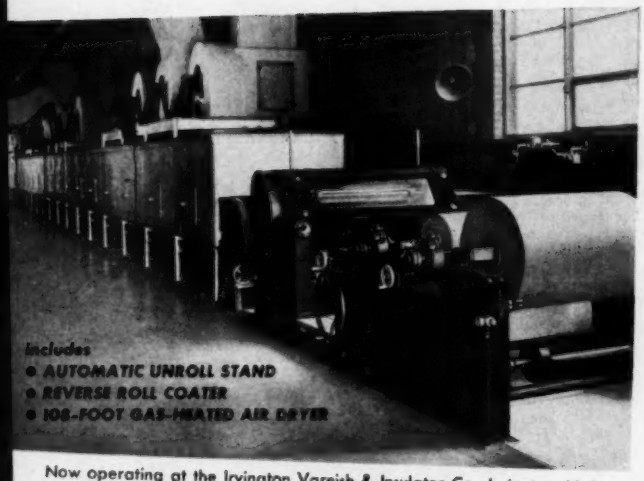
One of a series of advertisements describing Erie Resistor's complete facilities for quality custom injection molded plastics.

Plastics Division

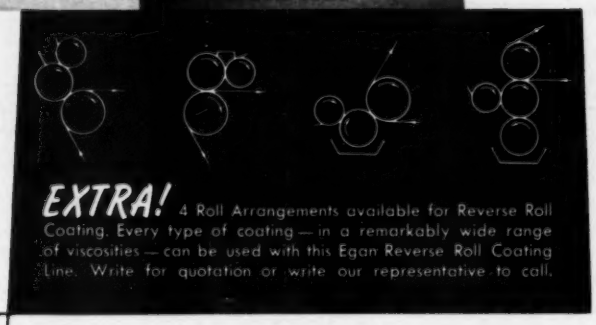
ERIE RESISTOR CORP., ERIE, PA.
LONDON, ENGLAND . . . TORONTO, CANADA

Complete Reverse Roll Coating Line

Designed and Built by Egan



Now operating at the Irvington Varnish & Insulator Co., Irvington, N. J.



EXTRA! 4 Roll Arrangements available for Reverse Roll Coating. Every type of coating — in a remarkably wide range of viscosities — can be used with this Egan Reverse Roll Coating Line. Write for quotation or write our representative to call.

Send for pamphlets on coating, treating and laminating

FRANK W. EGAN & COMPANY
Bound Brook, New Jersey

Designers and builders of: Treaters, Gummers, Laminators, Creepers, Air Dryers, Waxers, Coaters, Festooners, Saturators, Printers, Embossers, Winders and Special Machinery for Paper Converting.

Cable Address: "EGANCO"—BOUNDBROOK, N. J.

YOU PAY NO PREMIUM, yet you reap important dividends when your job is molded by Ideal Plastics, the world's largest injection molder. Ideal has an unmatched array of one hundred modern injection presses, two gigantic toolrooms, a production-wise engineering staff, superb finishing and packaging facilities—all of which serve as insurance that the parts you order will be exactly as you want them, delivered on time and to specification, in the recognized Ideal fashion.

Let's take a closer look at the insurance Ideal gives you:

molding presses No other molding organization has as many or as varied an assortment of injection presses. Whatever the job, Ideal has presses that are suited to produce it most economically. Sizes range from 3 to 300 ounces.

toolrooms Ideal's two toolrooms are equipped to construct any injection mold, regardless of size or complexity. Mold repairs or even major press repairs can be handled right in the plant and without delay by a toolroom staff of over eighty.

engineering The twenty engineers and fourteen draftsmen who are the nucleus of Ideal's development staff can boast of thousands of successful products which they have helped to create! And they can be of genuine help to you, too!

finishing Injection moldings generally need supplementary operations to yield finished products. That's why Ideal has an electroforming department, spray booths, arbor presses, drill presses and plenty of clamping and gluing equipment. Your products are shipped ready for sale or use.

Ideal has an injection molding "world of its own" right under one roof . . . 500,000 square feet exclusively devoted to every phase of fine injection molding. If you need insurance that your requirements for custom molding will be met to the letter, it's a sound idea to have us look over your specifications and submit a quotation. Send details about what you want molded to A. C. Manovill, Vice President in Charge of Sales. Ideal Plastics Corporation, 184-10 Jamaica Avenue, Hollis 7, New York. Phone: AXtel 7-7000. Mid-West Representative: Steel Mill Products Co., 176 West Adams Street, Chicago 3, Illinois. Phone: CEntral 6-5136.

Better Molded Plastics Ideal *for Industry & Home*

Is sewing vinyl raining out your profits?

WELD VINYL ELECTRONICALLY ON

Thermatron

HIGH FREQUENCY SEALING AND HEATING EQUIPMENT

The very *chemistry* of vinyl film suggests sealing it electronically . . . a *welding* process that produces a permanent, waterproof bond without those weakening perforations resulting from ordinary sewing. Naturally, the welding of plastics calls for THERMATRON equipment, pioneer in the field.

Fortunately for the vinyl fabricator, the technically correct sealing method is the fastest and least expensive! With THERMATRON electronic generators and presses you'll "run rings" around your present production costs. Imagine sealing almost any plastic product you can name *in seconds* . . . and doing it better and cheaper with less labor!

THERMATRON sales engineers would like to show you how installation of this modern production equipment can pay off quickly with only a reasonable capital investment, and without the need of specially skilled operators. Write or phone us now, and ask for Bulletin No. 63.

Standard THERMATRON models from ¼ KW to 6 KW weld vinyl from .002" to .080", serving most requirements—or we can build to special application. Equipment also available for sealing cellulose acetate, and for electronic gluing of furniture and other wood products.

RADIO RECEPTOR COMPANY, INC.

Since 1922 in Radio and Electronics

SALES DEPT: 251 W. 19th St., New York 11, N. Y. • FACTORY: 84 N. 9th St., Brooklyn 11, N. Y.

Thermatron DIVISION

In use in 24 countries outside of the United States

ABROAD

THE CHOICE IS mpm EXTRUDERS

North, south, east, west . . . wherever people need precision plastics extrusions, you'll find MPM extruders making them. From Kansas City to Karachi, from Boston to Buenos Aires, MPM extruders are the choice of many leading plastics technicians.

Why? First—because MPM extruders are supplied ready to run. Often, complete even to dies, if required. Installation consists of lowering the extruder into place and attaching water and electric lines. It's as simple as that.

Second—the long life that's built into each MPM extruder in the form of solid corrosion resistant construction for all parts which contact the plastic, makes them preferred wherever replating or replacing of parts is difficult and expensive.

And third—thanks to MPM's unique multi-zone heat control system, just about any thermoplastic material can be extruded easily and at substantial rates. Nearly all material suppliers use versatile MPM extruders for both production and extrusion of experimental formulations.

Whether you operate in the heart of a modern metropolis or in a remote area—domestic or foreign, MPM extruders have many features which will interest you. Details supplied on request.

California Representative:
WEST COAST PLASTICS DISTRIBUTORS, INC.
2325 Jesse Street, Los Angeles 23, Cal.

15 Union St., Lodi, N. J., U. S. A.
Cable Address: MODPLASEX

BEHIND The Story of STANDS THE W-S "Completeline"...

THE SHORTEST DISTANCE BETWEEN PRODUCTION AND PROFIT

In a fast-paced industry like that of plastics molding, news becomes history almost over night. Only a few years ago, W-S was pioneering the "big" injection machines—eight, then 12, then a fabulous 16 ounces! Now, Watson-Stillman's high-speed production giants—the size of small locomotives — shoot almost 20 *pounds* per cycle.

Yes, plastics molding has come of age. What started only yesterday as a manufacturing business has become a major industry . . . its applications tested and proved . . . its markets huge and growing . . . its materials and products pronounced "critical" in the most vital fields of civilian and defense production.

W-S is proud of its right to claim an associate editorship in the "writing" of this typically American success story—the encyclopedia of plastics molding. We have worked closely with its chief editor—the molder himself—in developing the most complete line of production machinery anywhere available.

Always reflecting, and frequently anticipating the molders' needs, W-S has developed machinery ranging from one to 300 ounces capacity, and including complete installations for every material and method commercially employed in molding by compression, transfer, and injection techniques.

This kind of close association with the beginning, development, and assured *future* of the industry makes W-S more than ever your logical first-choice consultant on your present expansion or new-plant planning.

HYDRAULIC MACHINERY DIV. **WATSON-STILLMAN** Established 1848

Main Office and Plant: 150 Aldene Rd., Roselle, New Jersey
Branch Office: 228 No. La Salle St., Chicago, Illinois
Manufactured in Canada by — Canadian Vickers, Ltd., Montreal

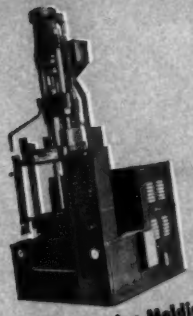
REPRESENTATIVES

Akron, Ohio	Watson-Stillman Co.	Los Angeles 11, Cal.	H. M. Royal, Inc.
Birmingham 3, Ala.	George M. Meriwether	Pittsburgh 19, Pa.	Stanley Berg & Co.
Buffalo, N. Y.	Don. W. Patterson Co.	San Francisco, Cal.	Shellenbach Mach. Tool Co.
Dallas, Texas	M & R Sales Company	St. Paul 4, Minn.	Anderson Machine Tool Co.
Denver 2, Colo.	Overgard Machine Tool Co.	Seattle, Wash.	Machinery & Tool Supply Co.
Indianapolis, Ind.	W. K. Millholland Mach. Co.	Spokane 8, Wash.	Machinery & Tool Supply Co.

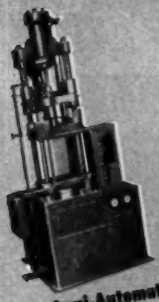
Foreign Sales Representative: OMNI PRODUCTS CORP., 460 Fourth Ave., New York 16, N. Y.
Correspondents Throughout the World

9-1-19

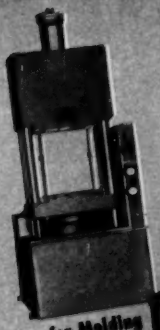
PLASTICS MOLDING...



Vertical Injection Molding Machines 1, 2, 4 and 6 oz.

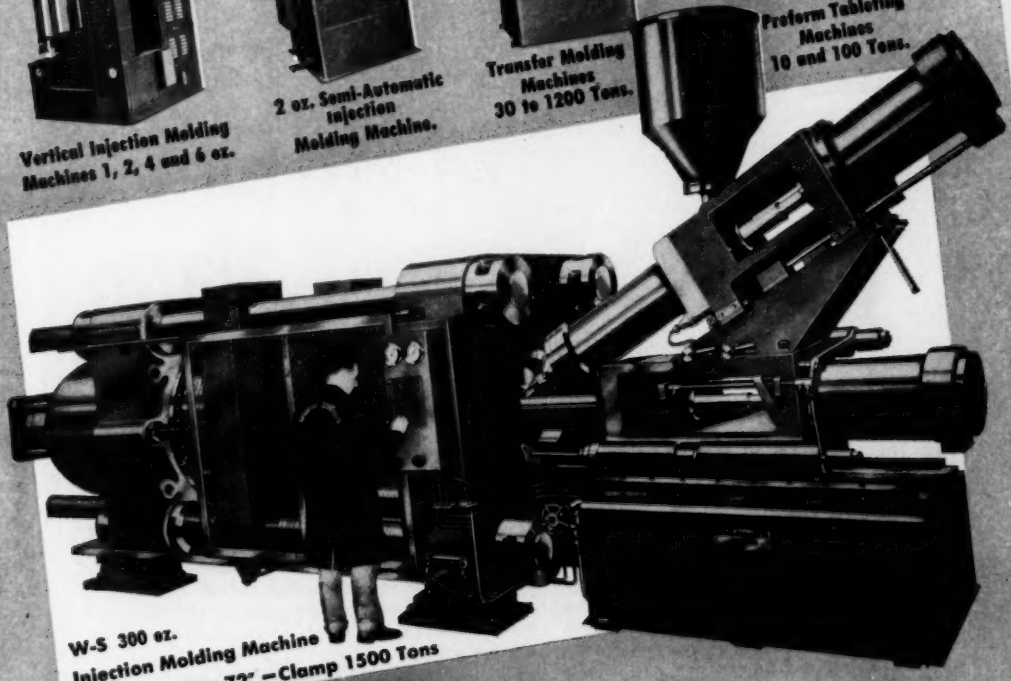


2 oz. Semi-Automatic Injection Molding Machine.



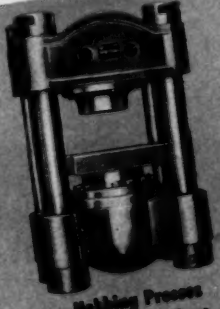
Transfer Molding Machines 30 to 1200 Tons.

Preform Tableting Machines 10 and 100 Tons.



W-S 300 oz. Injection Molding Machine Die space 48" x 72" — Clamp 1500 Tons

Compression Molding Presses-50 to 1200 Tons.



Hobbing Presses 200 to 2000 Tons.

Horizontal Injection Molding Machines-8 to 300 oz.

No cause for alarm*

Drop it... scrape it... bump it... sit on it! But don't concern yourself about its welfare! This luggage is made with a *Fiberglas* reinforcement!

Created by H. Koch & Sons, San Francisco, this Fiberglas-reinforced luggage is lighter than aluminum . . . stronger than steel. Molded-in colors are rainbow-bright and stay that way through years of the toughest travel. In fact, the Association of Baggage Traffic Managers has recommended it as the only baggage that can be safely checked *without a protective cover!*

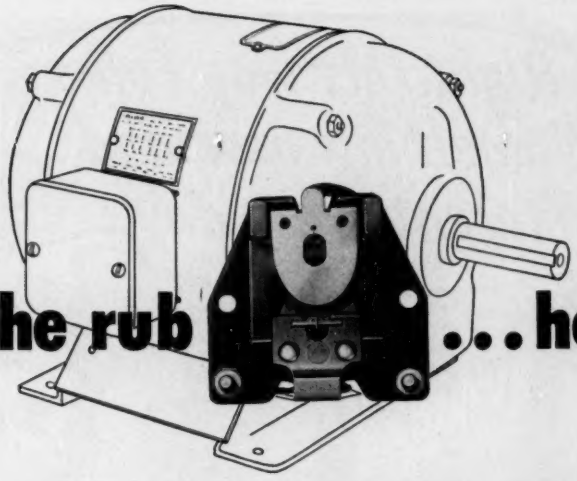
Alert manufacturers are using this rugged new material to make a host of civilian and military products, such as washing machine parts, fishing rods, boats, furniture, tote boxes, military instrument cases, and aircraft components . . . wherever light weight, durability, resistance to age, weather, water, acids and oils are a *must.*

Investigate Fiberglas reinforcements for yourself. For further details write: Owens-Corning Fiberglas Corporation, Reinforced Plastics Division, Department 125, 16 East 56th Street, New York 22, N. Y.

*IT'S PLASTIC, REINFORCED WITH OWENS-CORNING FIBERGLAS *Yarns*

(Fiberglas is the trade-mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation for a variety of products made of or with fibrous glass.

FIBERGLAS IS IN YOUR LIFE... FOR GOOD!



Here was the rub ...here

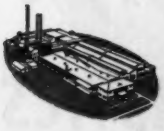
is the remedy

Moulded glass-filled polyester part resists abrasion 3 times as long

WHAT'S THE SECRET of keeping your product ahead of the field? Here's one—and one of the best. • There's a certain single phase motor in the Robbins and Myers line. For years, it has stacked up as good as, or better than, competition in every way—including performance, of course. But Robbins and Myers engineers began to observe that motor wear eventually showed up first in the same particular part—a standard phenolic contact arm that, at the starting phase of the motor, makes sliding contact with a moving chrome-plated steel face plate. • Standard phenolic (only choice at the time) did a good job, but something better was wanted. So we developed a moulding technique for a material that would improve performance. Now that intricate contact arm is moulded of glass-filled polyester, Kurz-Kasch Mix KK-100. Its insulating qualities are better — it's stronger—it resists abrasion 3 times as long—and it has outperformed every other insulating material tested. • So here's a fine product made better, thanks to enlightened product analysis and engineering. And—if you'll excuse the commercial — thanks to a plastics moulder with the facilities and talents to fit into every kind of development program. We're one of the few custom moulders in the country currently producing parts of *all* thermosetting materials including such specialties as Teflon and Glass-Filled Polyester. We can help you because we keep improving *our* services, too.

Kurz-Kasch

FOR OVER 35 YEARS PLANNERS AND MOULDERS IN PLASTICS



Kurz-Kasch, Incorporated • 1415 South Broadway • Dayton 1, Ohio

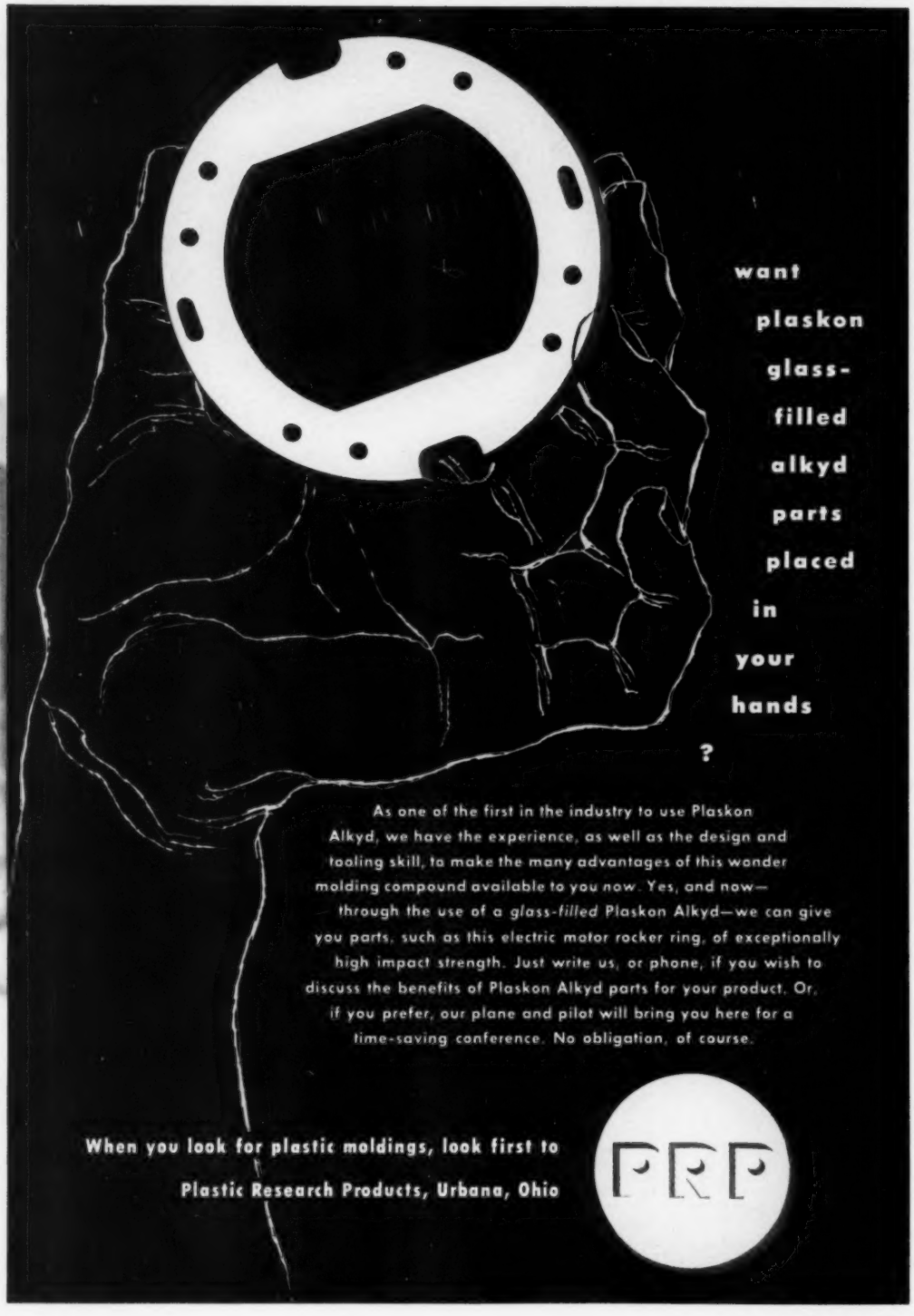
BRANCH SALES OFFICES: New York, *Lexington 2-6677* • Rochester, *Hillside 2415M* • Chicago, *Harrison 7-5473* • Detroit, *Trinity 3-7050* • Philadelphia, *Granite 2-7484* • Dallas, *Lakeside 1022* • Los Angeles, *Richmond 7-5384* • St. Louis, *Delmar 9577* • Toronto, *Riverdale 3511* • **EXPORT OFFICE:** 89 Broad Street, New York City, *Bowling Green 9-7751*.

Erinoid Plastics Materials

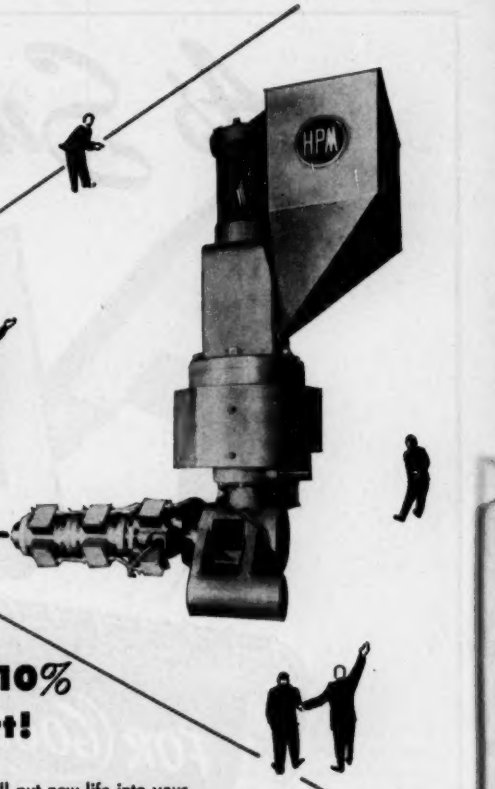
are used in the manufacture of high grade

ELECTRICAL ACCESSORIES

ERINOID LIMITED • STROUD • GLOUCESTERSHIRE

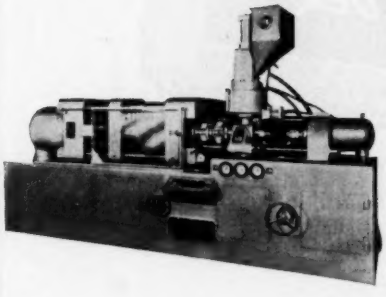

want
plaskon
glass-
filled
alkyd
parts
placed
in
your
hands
?
As one of the first in the industry to use Plaskon Alkyd, we have the experience, as well as the design and tooling skill, to make the many advantages of this wonder molding compound available to you now. Yes, and now—through the use of a *glass-filled* Plaskon Alkyd—we can give you parts, such as this electric motor rocker ring, of exceptionally high impact strength. Just write us, or phone, if you wish to discuss the benefits of Plaskon Alkyd parts for your product. Or, if you prefer, our plane and pilot will bring you here for a time-saving conference. No obligation, of course.
When you look for plastic moldings, look first to
Plastic Research Products, Urbana, Ohio
PRP

CONVERT
Your HPMs To
Pre-Plasticizing



Molders have actually doubled production, with 10% weight saving in each part!

● Yes, H-P-M preplasticizing units will put new life into your 9 and 16 oz. machines . . . plasticizing capacity will be doubled . . . shot capacity tripled! Parts will be strain-free because injection pressure is usually below 8000 p.s.i. with automatic drop-off to lower pressure when mold is filled. Preplasticized molded parts normally weigh 10% less. Measured feed has been totally eliminated. Material burning or discoloration is no problem because temperatures never exceed the plastic's burning point . . . no need of turning off the heat or purging when changing molds!

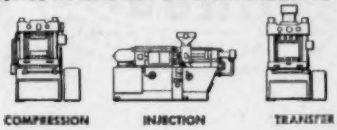


An H-P-M 16 oz. machine equipped with 32 oz. preplasticizer molds an 18 oz. part with projected area of 282 sq. in., using only 350-ton clamp . . . cycle time just 45 seconds. On another part, weight dropped from 26 to 20 ozs. and cycle time was reduced from 85 to 45 seconds! You can't afford to overlook preplasticizing! Savings in molding material alone will pay for the conversion unit in a year's time.

Write today for more detailed information.

HPM

PLASTICS MACHINES FOR EVERY MOLDING JOB

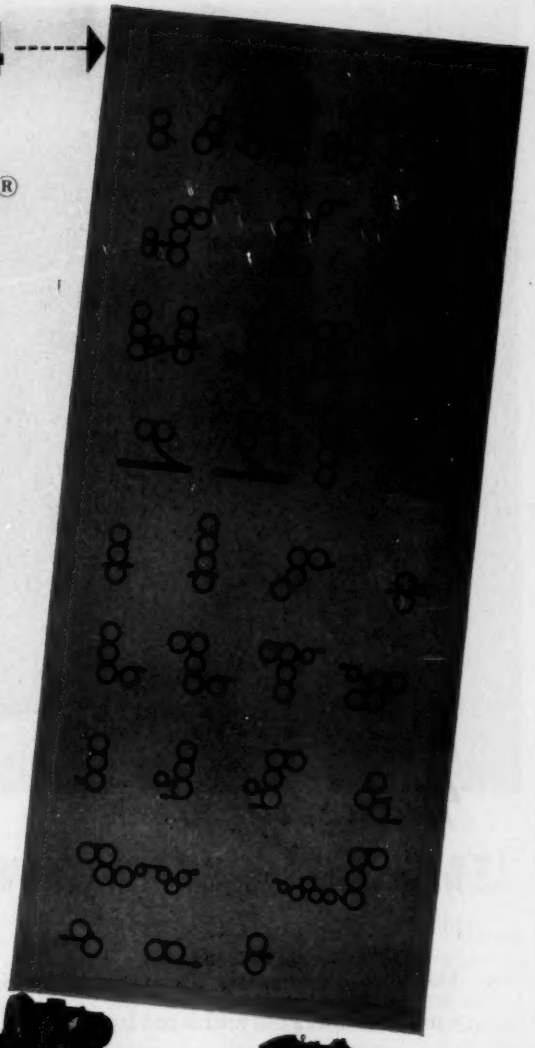


THE HYDRAULIC PRESS MFG. CO.

1010 MARION RD., MT. GILEAD, OHIO, U. S. A.

THE ODDS ARE 34 TO 1

Farrel-Birmingham® Has Designed Your Calender



Farrel-Birmingham has built every one of the calenders represented by these thirty-four diagrams. As a result, you can be almost certain that the basic design for the "specialized" machine you require has already been worked out by F-B engineers and proved on the job.

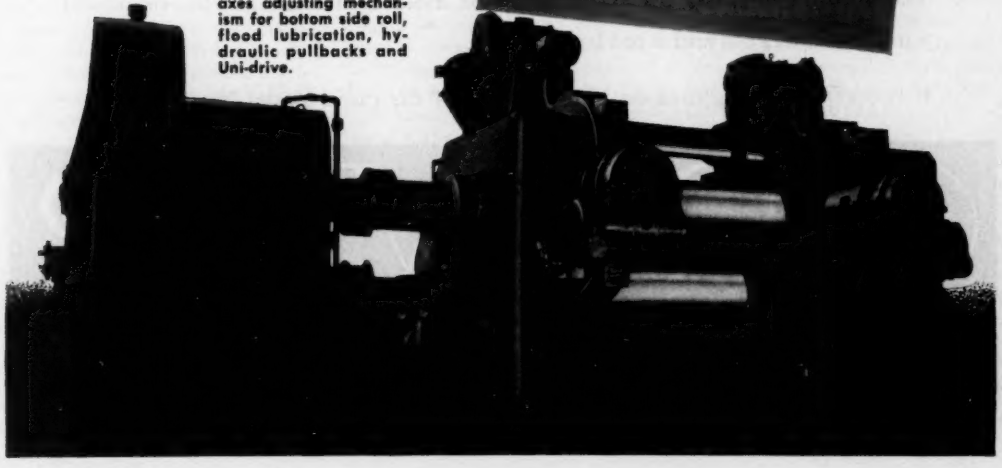
But this does not mean that the calender you buy will be an off-the-shelf machine. To the contrary, physical proportions, materials, type of construction, lubricating system, gearing, special operating features — in fact, every detail of every calender is designed for a specific job.

Why not take advantage of Farrel-Birmingham's unequalled experience. We will engineer a calender with any combination of design features and attachments necessary to fill your particular requirements. For further details, send for a copy of Bulletin 174.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT
Plants: Ansonia and Derby, Conn., Buffalo, N.Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston.

Farrel-Birmingham®

FB-713



32"x92" four-roll, Z-type calender with crossed axes adjusting mechanism for bottom side roll, flood lubrication, hydraulic pullbacks and Uni-drive.

Plastics for Industry

Here's another example of CRUVER'S fine finishing work in the decorative plastics field.

The plastic nameplate illustrated above is molded of clear acrylic, decorated with 24 Karat gold and a red background.

It is currently being used on Motorola's 1951 car radio model No. 601.

CRUVER

Manufacturing Company

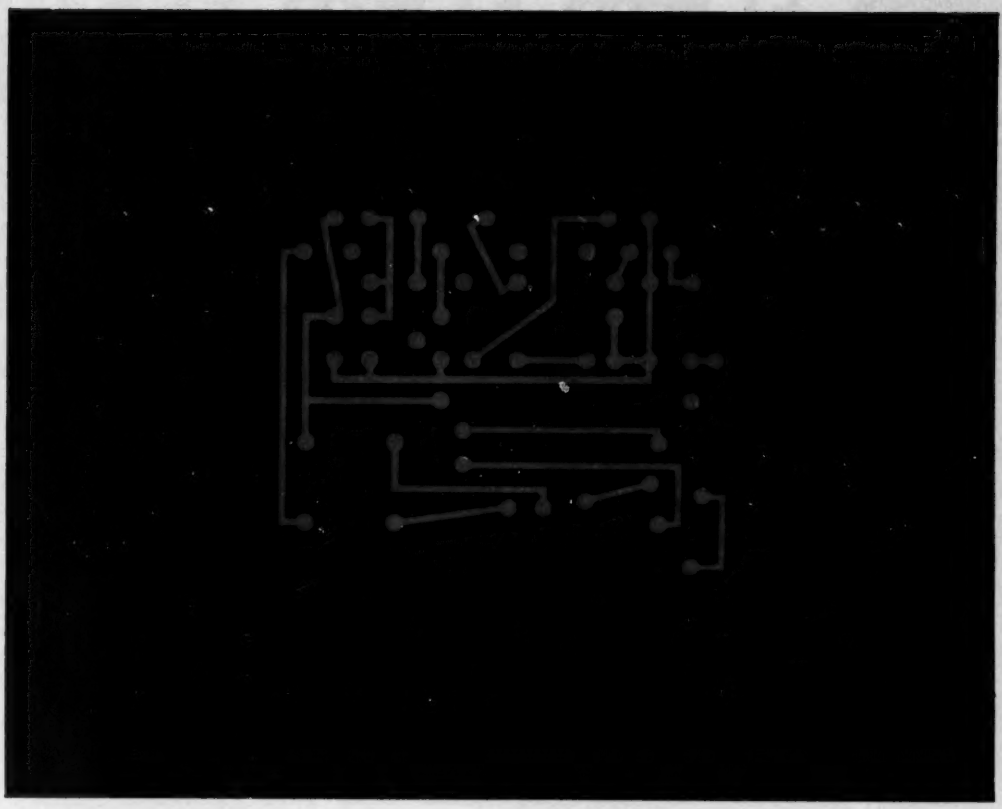
2460 W. JACKSON BLVD. CHICAGO 12, ILLINOIS

MOLDING • FABRICATING • LAMINATING • FINISHING

PIONEERS IN PLASTICS SINCE 1896

"BAS RELIEF" DECORATING • ASSEMBLY • SPRAYING

Branch Offices: DAYTON • DETROIT • MINNEAPOLIS • NEW YORK • PHILADELPHIA • SYRACUSE



WORKING DRAWING THAT MEANS...JUST THAT!

Like the 500-year-old invention of movable type, the development of today's *printed* electric circuits makes it far easier and more practical for people to communicate with each other. Printed circuits are simplifying production of hearing aids, radio and television sets, and electronic test equipment. They have made such articles smaller, lighter, more reliable, easier to maintain, and lower in cost.

A printed circuit is a working drawing—*working*. A typical one is made by simple photoengraving of a diagram on a light-sensitized, copper-clad, laminated plastic sheet. When the unwanted copper has been etched away, the remaining copper becomes the permanent electrical conductor, in any desired circuit configuration.

BAKELITE Bonding Resins firmly hold the copper to the base sheet, resisting the attack of engraving chemicals. Later, they withstand the heat of soldering and use. The base sheet is a low-loss, paper-base plastic laminate made with BAKELITE Phenolic Laminating Resins.

A major benefit of printed circuits is the "miniaturization" of equipment. Sub-miniature assemblies formerly raised extremely vexing problems of production, performance, and repair. Now printed circuits, completed by advanced techniques such as the "one shot" soldering of all connections, reduce costs to a level where replacement is cheaper than repair.

The contribution of Bakelite engineers to printed circuits is the providing of resins and plastics with the required properties. Such properties as bond strength, resistance to thermal shock, dielectric constant, power factor and moisture absorption, are broadly controllable in these BAKELITE Plastics and Resins.

Perhaps there is one that can be fitted to your particular needs. Outline your problems. Call us in to confer. Write Dept. CJ-13.

BAKELITE
TRADE-MARK
PHENOLIC RESINS

TRADE MARK

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

It's NEW... NEW... NEW...

Ask Ackerman

1. Strong as Aluminum—6/10 the weight. 2½ weight-strength ratio to steel.
2. Great Impact Strength—Izod values range between 12 to 24 foot pounds.
3. Resists Arcing—Consistently over 180 seconds by ASTM testing methods.
4. Resists Heating—Will stand 300°F for long periods. 400°F for short periods. Won't distort under 400°F.
5. Chemical Resistance—Not affected by hydrocarbons, ether neutral organic solvents and mold acids.
6. Water Resistance—24 hours at 25°C, less than 0.35%. After 7 days, 0.8%.

GOOD NON-CONDUCTOR . . . .
SUPERIOR ELECTRICAL PROPERTIES

Ackerman Plastic Molding
Division of
THE CONSOLIDATED IRON STEEL MFG. CO.
1293 East 53rd Street • ENdicott 1-4400 • Cleveland, Ohio

ACKERMAN

PLASTICS SCRAP

bought sold reworked

We offer
the World's finest facilities for:
RECLAIMING • REPROCESSING
RECOMPOUNDING • RECOLORING

We reprocess *Your* Plastics Scrap, By-Products, Surplus for *Your* own Re-Use.
We have complete laboratory facilities for Testing, Analyzing, and Pilot Running of Customer's Materials.

OUR SERVICE

As the world's leading Plastics Scrap Reclaimers we offer the almost unlimited facilities of our vast plant to industry in these days of shortages in all basic raw-materials.

We have available over 150,000 sq. ft. of floor space devoted exclusively to the processing of plastics — virgin and scrap — resinous materials or by-products.

We specialize in the reduction to small particles — to your most exacting specifications — of all lumps, blocks, mill ends, bleeder waste — regardless of size and whether rigid or soft.

We also custom-compound *all* thermoplastics to your specifications.

GRANULATING • PELLETIZING
CHEMICAL FLOTATION • WASHING • CLEANING • DRYING
SEPARATION OF CONTAMINATED MATERIALS
REMOVAL OF FOREIGN MATTER
COMPOUNDING • MIXING • COLORING • EXTRUSION

UNLIMITED KILN DRYING FACILITIES

A. BAMBERGER

CORPORATION
PLASTICS MATERIALS
703 Bedford Avenue, Brooklyn 6, N. Y.
Phone: MAin 5-7150
CABLE: CHEMPROD BROOKLYN

Chemicals you live by

IMPROVE YOUR... LAMINATES with DIAMOND PRECIPITATED CALCIUM CARBONATES

Laminators and molders find that smoother surfaces, elimination of cracks and of evidence of glass fibres result when DIAMOND Precipitated Calcium Carbonates are mixed with catalyzed, glass-reinforced polyester resins. This is due, in part, to the more even rate of cooling induced by the carbonate filler.

Other advantages in using DIAMOND Precipitated Calcium Carbonates are improved wet strength of the polyester resin, reduced shrinkage and, of course, *lower raw material cost.*

DIAMOND ALKALI offers several grades of Precipitated Calcium Carbonates, each chemically produced under carefully controlled conditions to assure day-to-day uniformity of particle size and purity.

Specifically recommended for reinforced polyester resins are:

SURFEX* — coated with 1% resin; particle size about 10 microns.

SUSPENSO* — same as SURFEX except uncoated.

KALITE* — coated with 1% stearic acid; particle size about 1 micron.

MULTIFEX* MM — uncoated, particle size about 0.06 micron.

For further information write for DIAMOND's Bulletin "The Use of Precipitated Calcium Carbonates in Polyester Resins". Our Technical Service Staff is also available to assist you on formulating problems. *®

DIAMOND SALES OFFICES: New York, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, St. Louis, Memphis and Houston. Also representatives in other principal cities.

DIAMOND CHEMICALS FOR PLASTICS COMPOUNDING

DIAMOND ALKALI COMPANY...CLEVELAND 14, OHIO

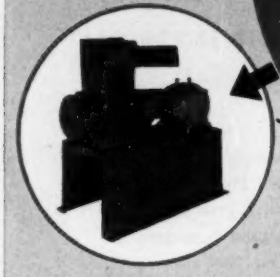
DIAMOND ALKALI CHEMICALS

MODEL ½, DIRECT COUPLED

MODEL ½, V-BELT DRIVEN

THE GRANULATOR *YOU* NEED is made by CUMBERLAND

MODEL 18 (LARGE CAPACITY)



MODEL 10 (6" x 10" THROAT OPENING)

YOU'LL GRANULATE FASTER, CUT PRODUCTION COSTS WITH THE CUMBERLAND MACHINE THAT'S BUILT FOR YOUR JOB REQUIREMENTS

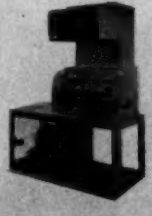
Selecting the *right* granulator for your needs is important! By choosing a machine that's best suited to *your* requirements, you'll save materials, time and money.

To make your selection problem easier, Cumberland has developed a complete line of rugged granulating machines — each designed to excel under specific job conditions. The granulator you need is among them.

Cumberland engineers — backed by a practical understanding of your problems and how to solve them — will be glad to recommend the plastics granulator that's right for *you*. Write for details today!

For technical information about Cumberland granulating machines, request Bulletin 750.

OTHER CUMBERLAND MACHINES



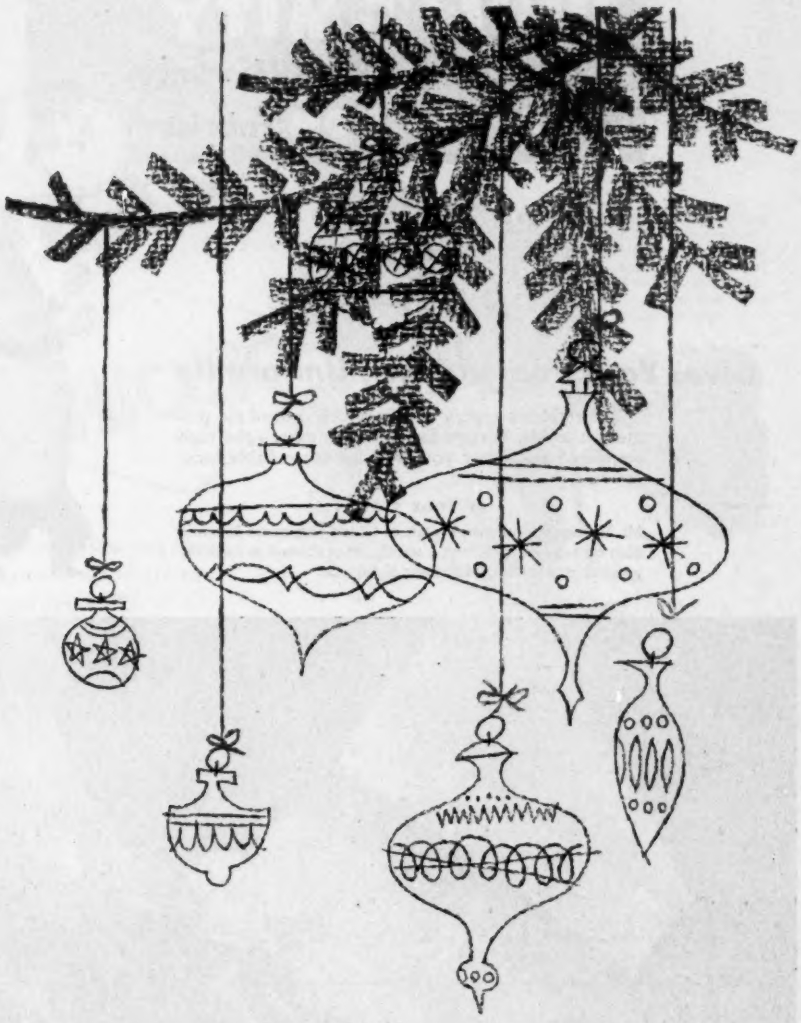
PREBREAKER

Cuts up radio, television cabinets and other large parts. Two machines available: Model 32 (20" x 32" throat opening); Model 24 (10" x 24" throat opening). Write for details.

ROTARY CHOPPING MACHINE

Heavy duty, rugged machine. Used for cutting thick vinylite slabs from two roll mills. Also used as large capacity pelletizer. Other applications are described in Bulletin 400.

California Representative:
WEST COAST PLASTICS DISTRIBUTORS, INC.
2325 Jesse Street, Los Angeles 22, Cal.



SEASON'S GREETINGS

and Best Wishes for a Peaceful,

Prosperous New Year

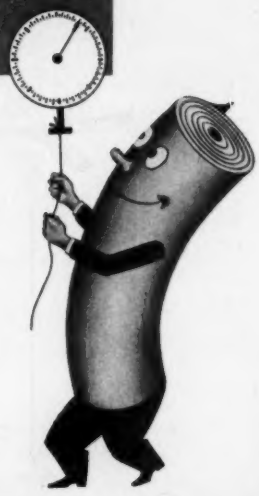
Nixon Nitration Works

Nixon, New Jersey

UNIFORMITY

Makes the Big Difference

in LAMINATION Fabrics



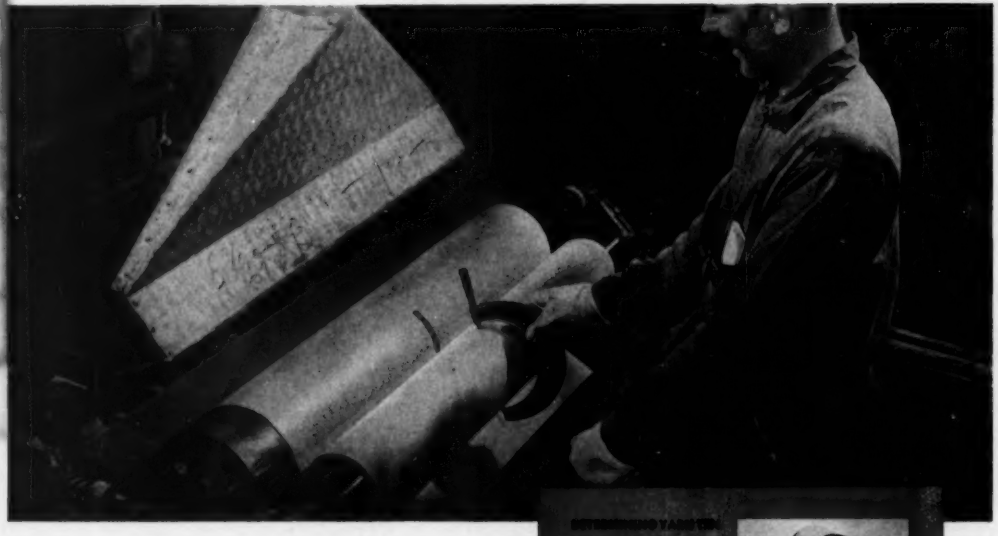
MT. VERNON EXTRA

Gives You Greater Fabric Uniformity

The rigid laboratory checks which control the production of Mt. Vernon Extra fabrics assure the high degree of uniformity you need for dependable lamination.

AT YOUR SERVICE

Mt. Vernon-Woodberry's staff of textile engineers is available on request to help you with your problems in development or application of industrial fabrics.



Mt. Vernon-Woodberry Mills

TURNER HALSEY COMPANY

Selling Agents

40 WORTH ST NEW YORK

Branch Offices: Chicago • Atlanta • Baltimore

Boston • Los Angeles • Akron

SAVE SCARCE PLASTICIZER

BY USING PLIOVIC

HERE'S WHERE SAVINGS BEGIN—*adding* PLIOVIC *to production premixer. More efficient plasticizing of this use-proved vinyl chloride copolymer means lower cost production.*

THE more efficient internal plasticizing action of PLIOVIC — Goodyear's vinyl chloride copolymer — will save you from 10% to 15% scarce plasticizer in either calendered or extruded vinyl items. Here is your opportunity to overcome your shortages, reduce your costs — and maintain the quality of your finished items.

PLIOVIC gives you other advantages, too—adding up to savings in both time and money. You can process at lower temperatures, mix faster, load higher with extenders or pigments with little or no sacrifice of physical properties. And PLIOVIC will assure you of tough, lightweight, water and chemical resisting products with excellent heat, light and age stability.

PLIOVIC is available in two forms—PLIOVIC A for calendered and extruded items (also as AR with reduced bulking value) and PLIOVIC AO for organosols. Write today for samples for evaluation and full details to:

Goodyear, Chemical Division
Akron 16, Ohio

USE PROVED *Products*

GOODYEAR

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

Pliovic—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

TALK ABOUT SMOOTH STUFF!

Smooth? This location is famous for its smoothness
—and what does it get the young lady! She will collectively spend millions a year long before she arrives
at our age—thirty years—to transfer that smoothness to a place where it can be seen and touched—er—more frequently.

Factory operation must at least *appear* smooth to the customer. It never is, but the results count.

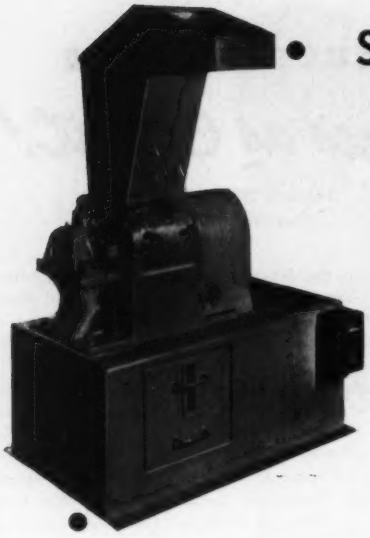
We've spent over thirty years—not on lotions and creams, but on systems and people. They consume the aspirin
—our customers can use their's for their own internal problems.

In plastic molding we take over the worries—that's our job. Ask us about it!

BOONTON MOLDING CO.

BOONTON, NEW JERSEY

NEW YORK OFFICE — CHANIN BUILDING, 122 EAST 42ND STREET, MURRAY HILL 6-8540



SMALL B&J CUTTERS with 50 to 250 lbs. per hr. grinding capacity!

The Laboratory 251 eliminates pre-cutting of large thin section reject parts. Suitable for mounting beside injection molding machines where minimum floor space is required yet large hopper with 8" x 8" throat and 100 to 150 lbs. per hr. capacity are desirable.

Place this *newly designed* Handy Midget beside molding machines. Provides 50-75 lbs. per hr, capacity, handling gates, sprues, etc. from ¼" to ½" sectional thickness, dependent on type material, fed into 5½" x 6" throat.

The new Standard Ideal "301" features a wider throat —6" x 10"—to eliminate common feeding problems and clogged hoppers. Can reduce all types of plastic compounds up to ½" sectional thickness, at up to 250 lbs. hourly.

Contact Your Nearest B & J Representative

SAN FRANCISCO, CALIFORNIA: B-H-S Machinery Sales Company; LOS ANGELES, CALIFORNIA: Machinery Sales Corporation; PITTSBURGH, PENNSYLVANIA: Stanley Berg & Company; OMAHA, NEBRASKA: Fuchs Machinery & Supply Co.; CINCINNATI, OHIO: Index Machinery Corporation; SPOKANE, WASHINGTON: W. R. Matthews Machinery & Tool Supply Company; CHICAGO, ILLINOIS: Neff Kohlbusch & Bissell; MILWAUKEE, WISCONSIN: Neff Kohlbusch & Bissell; MINNEAPOLIS, MINNESOTA: Charles W. Stone Company; LEOMINSTER, MASSACHUSETTS: Standard Tool Company; DETROIT, MICHIGAN: Thoreson-McCosh, Inc.; CANADA—TORONTO & MONTREAL: Williams & Wilson Ltd., FOREIGN DISTRIBUTORS: Omni Products Corp., New York 16.

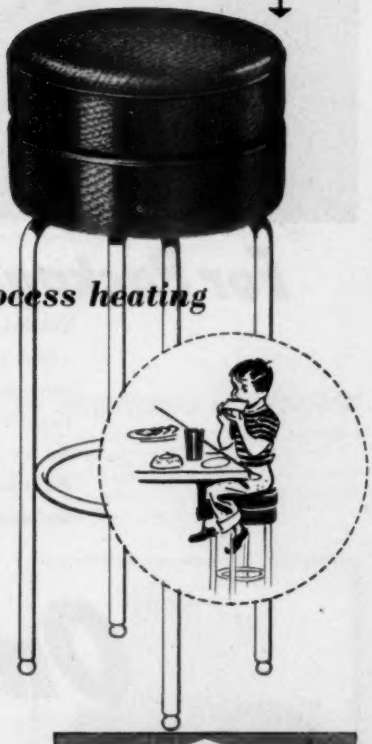
BALL & JEWELL, INC.

26-28 Franklin Street, Brooklyn 22, N. Y.

for injection

or

extrusion



Dowtherm

improves quality through controlled process heating

DOWTHERM® provides the uniform, precisely controlled temperatures that mean improved product quality and reduced operating costs. These important advantages have resulted in the use of this modern heat transfer medium for injection molded and extruded plastic products.

DOWTHERM speeds the heating cycle while at the same time reducing labor costs. In addition to being used in forming operations, DOWTHERM's ease of control and application also assists in the mass production of nylon, and phenolic and alkyd resins.

Are you fully acquainted with DOWTHERM's higher operating efficiency? If *your* process requires temperatures between 300 and 750°F., we welcome the opportunity to discuss DOWTHERM with you. Write Dept. DO 20-A.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

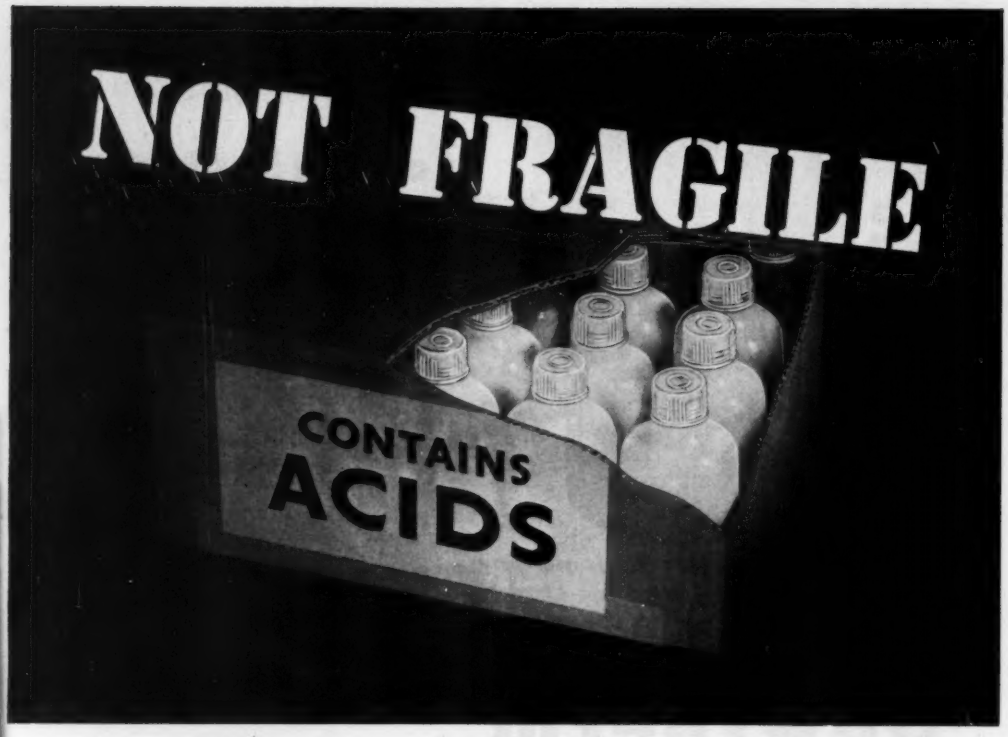
SPEEDS HEATING • IMPROVES PRODUCTION

DOWTHERM

DOW

CHEMICALS

INDISPENSABLE TO INDUSTRY AND AGRICULTURE



For Packaging Acids so that they can be shipped, stored and handled without fear of breakage, on the ground or in the air. Need to get a highly corrosive or expensive chemical somewhere in a hurry? The Plaxpak bottle is the answer. Take it high in the sky. Unequal pressures will cause it to flex, but not break or pop its closure. Drop it on the ground. It will bounce, but not break. Shipping weights are drastically reduced. When compared empty, the Plaxpak bottle is one-fifth the weight of glass; when filled, one-half the weight.

Only the best is

OTHER EMHART PRODUCTS INCLUDE:

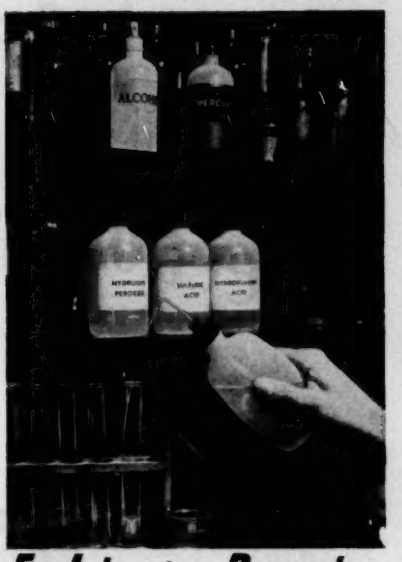
AUTOMATIC PACKAGING EQUIPMENT
STANDARD-KNAPP
Division of Emhart Mfg. Co.
PORTLAND, CONNECTICUT

GLASS MAKING MACHINES
HARTFORD-EMPIRE CO.
Division of Emhart Mfg. Co.
HARTFORD 2, CONNECTICUT

HIGH SPEED AUTOMATIC PRESSES
HENRY & WRIGHT
Division of Emhart Mfg. Co.
HARTFORD 5, CONNECTICUT

PREMIUM QUALITY STAMPING PRESSES
THE V & O PRESS CO.
Division of Emhart Mfg. Co.
HUDSON, NEW YORK

For Packaging Pharmaceuticals in liquid or powder form, the Plaxpak bottle offers the triple advantages of unbreakability, lightweight and, where desired, controlled dispensing as a spray, stream or droplet. Shown above are some stock bottles for medicinal use.



For Laboratory Research the Plaxpak bottle provides the convenience of an unbreakable, chemically inert container, and the added advantage of controlled dispensing. The stream dispensing fitment shown above was developed by S. H. Ansell & Sons, Boston, Mass.

For Boosting Turpentine Production the Plaxpak bottle has proven an invaluable aid. It is used as a container for sulfuric acid, which is squirted into "wounds" in the tree to increase sap flow. Safe, easy to handle and inert to the acid, the Plaxpak bottle speeds up operations, vastly increases manhour output and helps to lengthen tree productivity.

good enough

HELPFUL PLAX LITERATURE
Catalogs on Plaxpak bottles and other Plax products are available on request. Also available is a booklet "Fabrication of Polystyrene."

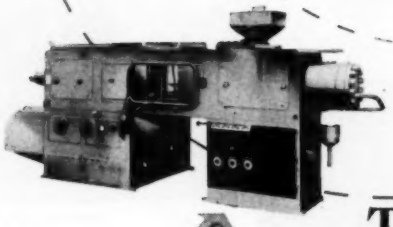
"Plaxpak" is a registered T.M. of Plax Corp.
Plax blow-molded products are made under the following U. S. Pats.: 2128239, 2175053, 2175054, 2230190, 2260750, 2283751, 2349176, 2349177, 2349178, 2230188. *Reg. U. S. Pat. Off.

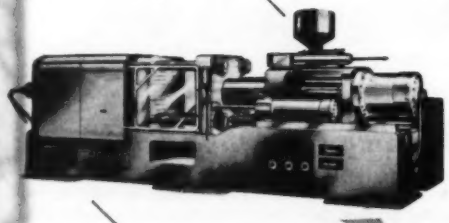
PLAX
FOR PLASTICS
NOT SUBSTITUTES IMPROVEMENTS

PLAX CORPORATION
Subsidiary of Emhart Mfg. Co.
P. O. BOX 1019, HARTFORD 1, CONN.
In Canada, Plax Canada, Ltd., Toronto
Sales Offices: New York City, Syracuse, Philadelphia, Cincinnati and Chicago.

focus on injection moulding machines

PECO PROJECTILE PRODUCTS





THE attention of Plastics manufacturers may profitably be centred on PECO Injection Moulding Machines, for they are designed to give high productivity through maximum efficiency.

They are built in 2oz., 4oz., 8oz., and 16oz. capacities. They represent the most up-to-date development of this type of plant.

Full particulars will be sent on request.

MOULDS

PECO MOULDS. Expert designers and mould makers are employed and moulds can be supplied to samples submitted, including die-sinking models if desired. An important side of the Company's work is the hobbing of cavities for moulds and medallions—the plant includes a 3,000-ton Hobbing plant. Master Hobs to customers' samples made as required.

THE PROJECTILE & ENGINEERING COMPANY LTD.

ACRE STREET, BATTERSEA, LONDON, S.W.8, ENGLAND

Telephone: Macaulay 1212 Telegrams: "Profectus, Claproad, London". Cables: "Profectus, London".

Get Bulletin No. P-104

MONSANTO

HB-40

Low-cost Plasticizer

for

Polystyrene Casting Resins
Polystyrene Adhesives
Molding Polyvinylcarbazole
Vinyl Extrusions
Vinyl Plastisols and Organosols
Vinyl Calendered Film and Sheeting
Ethylcellulose Injection Moldings
Strip Coatings for Metals
Floor Tile Compositions
Asphalt Base Paints

AVAILABLE now—DRUMS, CARLOADS

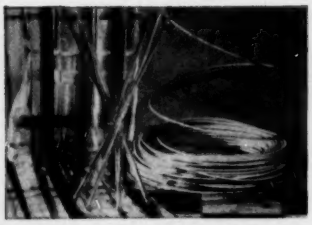
If you're interested in a plasticizer that helps reduce your cost and maintain your product quality, learn about HB-40 . . . It is a relatively nontoxic, high-boiling, colorless liquid that is of especial interest for plasticizing vinyl resins, polystyrene, ethylcellulose and asphaltic materials.

HB-40 resists fungus and organism attack. It has excellent resistance against moisture, acids and alkalies and common corrosive influences.

To find out how HB-40 can help you, send for Bulletin No. P-104. It's quite informative, as you will gather by glancing through the partial table of contents included at right . . . Samples of HB-40 will be supplied on request . . . Contact the nearest Monsanto Sales Office (see list at right) or write MONSANTO CHEMICAL COMPANY, Phosphate Division, 1700 South Second Street, St. Louis 4, Missouri.

Partial Contents... Bulletin No. P-104

Physical and Electrical Properties . . . Solubility and Compatibility . . . Plasticizing Properties: Low-temperature Flexibility, Volatility, Water Absorption, Tensile Strength and Elongation, Effect on Rubber, Color Stability . . . Toxicology . . . Uses: General, Polystyrene Casting Resins, Polystyrene Emulsion Adhesives, Molding Polyvinylcarbazole, Vinyl Extrusions, Vinyl and Vistanex Resin Adhesive Tapes, Vinyl Acetate Adhesives, Ethylcellulose Injection Molding, Floor Tile . . . Viscosity Charts



Typical products employing HB-40 as a co-plasticizer.

PHYSICAL PROPERTIES OF MONSANTO HB-40

Appearance:
Practically colorless, liquid.

Odor:
Faint and pleasant.

Specific gravity:
1.004 ± 0.003 @ 25/15.6° C.

Viscosity:
144 ± 20 SUS @ 37.8° C. (100° F.)
39 ± 1 SUS @ 98.9° C. (210° F.)

Pour Point:
−25° C. ± 1 (−13° F. ± 2).

Distillation range (corrected):

Start	340-349° C.	(645-660° F.)
10%	345-358° C.	(653-676° F.)
50%	353-360° C.	(667-680° F.)
90%	362-389° C.	(684-732° F.)
95%	371-396° C.	(700-745° F.)

Flash Point:
174°C.±6(345°F.±10)A.S.T.M.D92-24

Flame point:
196°C.±6(385°F.±10)A.S.T.M.D92-24

Vapor pressure:

Temperature °C.	mm. Hg
150	2
200	15
250	69
300	230
350	625
362	760

Evaporation loss at 100° C. for 6 hours:
0.033%

Stability to heat:
Appears stable at the boiling point.

Stability to acid and alkali:
Does not appear to undergo significant changes in composition when boiled with 10 per cent aqueous solutions of sulfuric acid or sodium hydroxide.

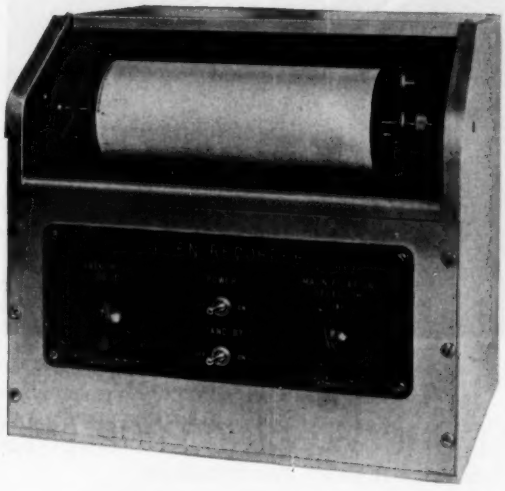
DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

MONSANTO
CHEMICALS—PLASTICS

SERVING INDUSTRY... WHICH SERVES MANKIND

THE All New OLSEN MODEL 51
ELECTRONIC RECORDER

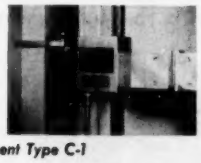
(with alcotran)



For Stress-Strain Work in Tension, Compression, Flexure, and special applications

- ★ Unexcelled Accuracy*
- ★ A Self-Contained Unit
- ★ Simplified Controls and Instrumentation
- ★ No Gear changes—change magnification by flipping a switch
- ★ Response—full chart 4 seconds
- ★ Letter sized Curves
- ★ Simplified Chart Clip

Standard S-Type Extensometer



Standard Strain Instrument Type C-1 Deflectometer and Crosshead.

- ★ Standard Instruments Available for Magnifications from 1000:1 to 1:1
- ★ Motion Detectors (differential transformers) available for special applications with linear motions from 0 to ±.150″ or 0 to ±2.50″ (total travel 0.3″ to 5.0″)

*All Olsen Recorders, Instruments, and Motion Detectors are calibrated to linear standards.

TINIUS OLSEN
Testing & Balancing Machines
TINIUS OLSEN
TESTING MACHINE CO.
2050 Easton Rd., Willow Grove, Pa.

HOW TO CALL AN END TO PHENOLIC MOLDING PROBLEMS

Call on Borden's DURITE.

The handset above is a good example of special properties in DURITE phenolic molding compounds created by Borden engineers to meet customers' special requirements. And a tough order it was . . . meet rigid government specifications for high impact strength, yet maintain sufficient resilience to withstand flexural loads.

This product molded of DURITE withstands sanding and buffing, resists body acids without dulling. For applications of this nature, both military and civilian, specify Borden's DURITE GP-120, Black.

In DURITE, Borden gives you the special properties you need, in the degree you want, by skillful combining of cellulosic, carbonaceous and mineral fillers with the resin base. Address your molding problems requiring Phenolic Molding Compounds to The Borden Company, Chemical Division, Dept. MP-121 350 Madison Ave., New York 17, N. Y.

Borden's DURITE

Molding Powders • Bonding Resins • Cements

Lustrous finish, high impact, dimensional stability are special properties of the Borden's DURITE phenolic used in this instrument housing.

Highest impact, good finish, uniform density are special properties of the Borden's DURITE phenolic used in this good-looking gun grip.

Improved impact coupled with good heat resistance are special properties of the Borden's DURITE phenolic used in this diamond wheel core.

AS A *stabilizer* AND *internal lubricant* FOR POLYVINYL CHLORIDE TYPE PLASTICS USE BVS®

This modified barium ricinoleate developed especially as a stabilizer for polyvinyl chloride type plastics functions also as a preferred internal lubricant, markedly facilitating processing operations such as calendering and extrusion.

BVS is supplied as a fine white powder, very easily incorporated with the plastic base to give clear transparent films.

BVS has been found especially effective in stabilization of polyvinyl chloride type plastisols.

When used alone, 3 parts of BVS per 100 parts of resin are suggested as giving optimum stabilization. However, BVS is normally used in conjunction with other stabilizers to achieve synergistic stabilization, and, in these cases, the 3 parts of BVS PHR may be reduced but not below a level of 2 parts of BVS PHR.

SUGGESTED BVS STABILIZER COMBINATIONS
which have proven effective

STABILIZER	PARTS PHR 1	2	3	4	5
BVS®	3.0	2.0	3.0	3.0	3.0
Vanstay L*	—	1.0	—	—	—
Plumb-O-Sil B**	—	—	1.0	—	—
Cadmium Ricinoleate	—	—	—	1.0	—
Victor 54***	—	—	—	—	1.0

1 **Good heat and fair light stability (reference base).**

2 **Good heat and excellent light stability.**

3 **Good heat and fair light stability plus exudation resistance.**

4 **Excellent heat and good light stability.**

5 **Good heat and very good light stability.**

Registered Trade Marks of: *R. T. Vanderbilt Co. **National Lead Co. ***Victor Chemical Co.

CALCIUM RICINOLEATE

In those cases where lack of toxicity is of prime importance we suggest calcium ricinoleate as a substitute for BVS. It is only slightly less effective than BVS in stabilization and lubrication action and is regarded as free from toxic hazards.

ESTABLISHED 1857

THE Baker CASTOR OIL COMPANY

120 BROADWAY, NEW YORK 5, N. Y.

LOS ANGELES • CHICAGO

THE BAKER CASTOR OIL COMPANY
120 Broadway, New York 5, N. Y.
Please send technical literature on BVS and a 1 pint sample.

Name_____

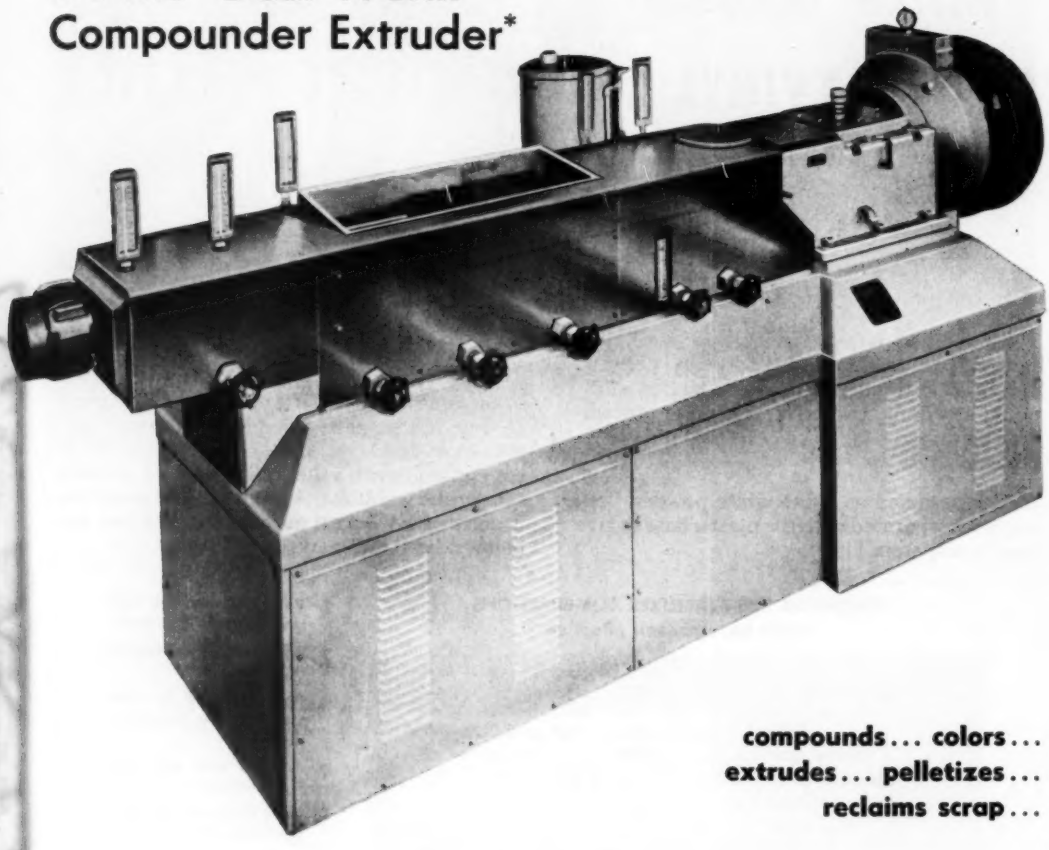
Title_____

Firm_____

Address_____

DO 5 JOBS ON THIS 1 MACHINE!

It's the "Dual Worm" Compounder Extruder*



compounds... colors...
extrudes... pelletizes...
reclaims scrap...

HERE is an extruding machine to slash your production costs by doing the work of five separate kinds of equipment.

The patented interacting "Dual Worms" that operate in a "pressurized" cylinder provide the explanation. They generate so much power, work so fast and knead so thoroughly that they're able to perform functions beyond the capacity of most conventional extruders.

Operation of the machine is simple and almost entirely automatic except for feeding raw materials or scrap into the hopper.

The "Dual Worm" Compounder Extruder is available with 2" worms—output approximately 100 pounds per hour. Larger, higher capacity units are in prospect.

Write today for prices and free descriptive brochure.

SMART & BROWN (Machine Tools) LTD.

24, 25, Manchester Square, London W. 1, England

Telephone: Welbeck 7941 Cables: Smartool, Wesdo, London

* By agreement with Messrs. WELDING ENGINEERS, Norristown, Pennsylvania, U.S.A., Smart & Brown (Machine Tools) Ltd. are the licensed manufacturers in England of 2" "Dual Worm" Compounder Extruders. They are also the sole distributors for all countries except North America. Local agents are being appointed.

Noma Plays SAFE with Flame-Resistant Hercocel*

A new addition to Noma's distinguished line of Christmas ornaments is the Glo-lite Musical Santa, an animated plastic figure which can be used as a table or mantel lamp, or as a window decoration. The big brass button on Santa's coat winds a spring mechanism operating a Swiss music box. As it plays, Santa rings the bell held in his right hand.

In selecting a plastic for this new product, Noma played safe... chose Hercules® Flame-Resistant Hercocel, the material which has proved itself in more than two years of use in Noma's Bubble-Lites and "Fancy Figures." This unique plastic, pioneered by Hercules, offers all the features of regular acetate, plus the advantage of being a self-extinguishing material which can be injection molded.

Hercules Flame-Resistant Hercocel is bringing added color and sales appeal to a growing list of electrical products. Our technical staff will be glad to help you apply it to your own needs.

HERCULES POWDER COMPANY *Cellulose Products Department, 916 Market Street, Wilmington, Del.*

Another Noma safety feature is this new plug with built-in fuse. When used for all lights on tree, the entire tree is protected.

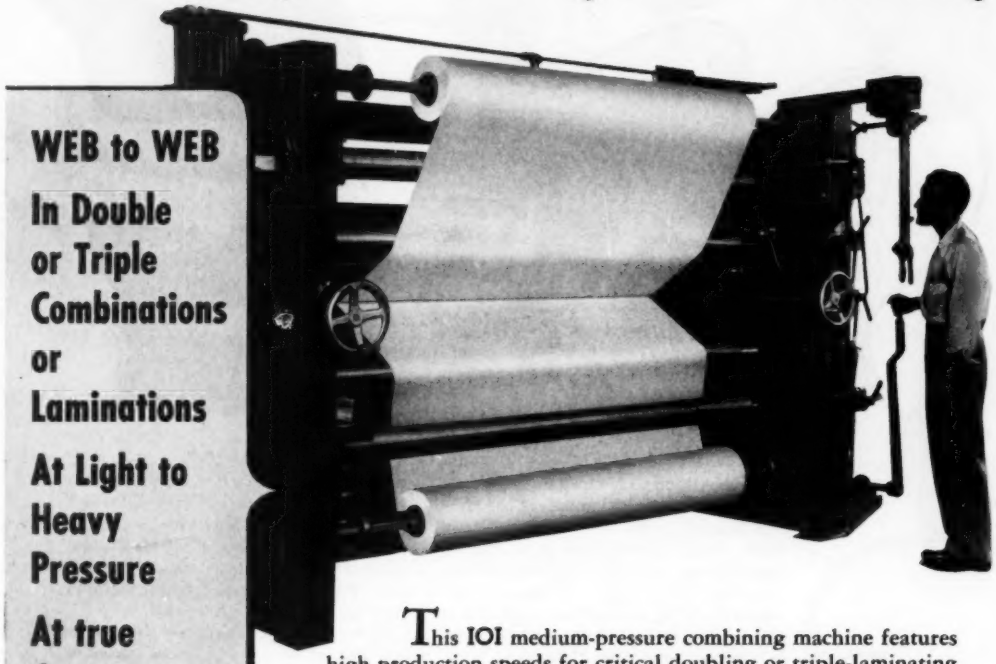
HERCULES Cellulosic Plastics

*TRADE-MARK

CP51-6

Designed and Built by IOI to improve your

Combining... Doubling... Laminating



WEB to WEB

In Double or Triple Combinations or Laminations

At Light to Heavy Pressure

At true Constant Tension and Variable Speeds

This IOI medium-pressure combining machine features high production speeds for critical doubling or triple-laminating operations. It is available in a variety of face widths, ranging from 36 to 96 inches. The machine pictured has a 90 inch face width.

Sandwich thickness is accurately controlled by micrometer roll spacers. All unwinding and windup heads are driven at true constant tension by a sensitive, variable-volume, variable-pressure fluid drive. Threading speeds down to 12 inches per minute are provided, as well as a reverse drive for easy stock handling and triple combining.

Lateral register is built into each unwinding head. Adjustable edge slitters are also incorporated. The unit will handle previously coated webs of pressure-sensitive materials. It can be used in conjunction with IOI fusing equipment for thermo-setting vinyl-based and other types of adhesives.

Variations of this machine's basic design are available for any roll face, operating speed or combining pressure.

An **IOI** engineer will be glad to show you how this machine can be applied to your particular processing requirements. Write on your business letterhead for further information.

INDUSTRIAL IOI OVENS, INC.

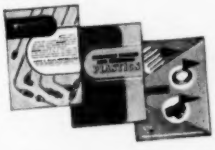
13825 TRISKETT ROAD CLEVELAND 11, OHIO

Cookie Cutters, Molded for the Chickadees, Tulsa, Oklahoma

Skillful Molding CUTS A CUTE COOKIE

These cookie cutters which we molded for the Chickadees, Tulsa, Oklahoma, are a real double feature. First they're attractive cookie cutters. Hang them on a Christmas tree and they're colorful ornaments. To gain this double appeal, the product had to be made of a plastic material. We chose a material that would be kitchen practical as well as Christmas tree glamorous. Sound engineering plus exacting molding craftsmanship did the rest.

We will handle your plastic problems with the same careful consideration of your product's requirements. So whenever plastics are called for—make our new, modern plant your first step to a better plastic product.



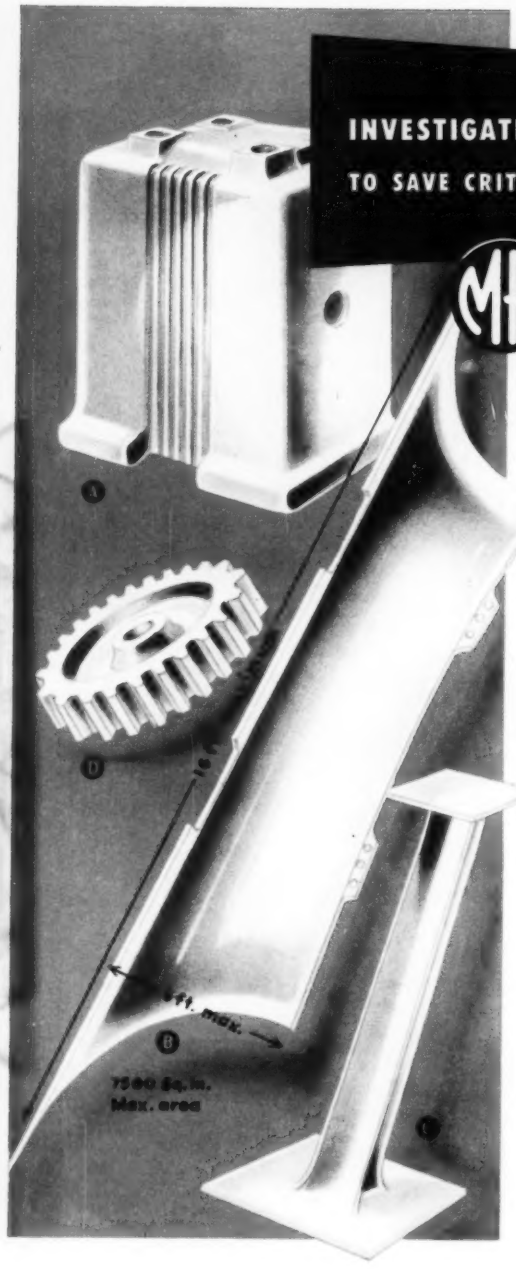
ELMER E. MILLS CORPORATION

INJECTION MOLDERS and EXTRUDERS of: Tenite, Lumarith, Plastacele, Lucite, Nylon, Fibestos, Plexiglas, Polystyrene, Styron, Loalin, Vinylite, Geon, Plexene, Polyethylene, Cerex, Forticel, [redacted]*, Saran, and other Thermoplastic Materials.

2930 NORTH ASHLAND AVENUE • CHICAGO 13, ILLINOIS

Write on your letterhead for the new Injection Molded and Extruded Plastics Catalog. Or, for detailed information about [redacted], piping, tubing and fittings, write for circulars containing data and illustrations.*

**Trademark Registered*



INVESTIGATE Plastics MOLDED BY MPc
TO SAVE CRITICAL METALS FOR CRITICAL NEEDS

MPc combines unmatched molding facilities with inventive engineering skill to make plastics perform in hitherto unsuspected ways

How can *you* employ molded plastic parts? There is no existing standard by which to judge. Yesterday's limitations on the use of plastics no longer exist. Amazing new molding materials and reinforcing materials are now available. New molding techniques developed at **MPc** utilize these materials for the production of molded plastic parts with greater areas, greater weight.. yes, and far greater strength. Here at **MPc**, the challenge of the new or unusual is met with a spirit of enterprise...supported by unique molding and tool-room facilities. Submit your plastics molding problem to MOLDED PRODUCTS CORPORATION, 4535 W. Harrison St., Chicago 24, Illinois.

A. HOUSINGS...
Complicated shapes produced in a single molding operation. Plastics adds color... sleek lines...mold-perfect finish.

B. SHAPED PANELS...
Molded complete with assembly holes or studs. No fabricating cost, no finishing cost.

C. STRUCTURAL MEMBERS...
Combine light weight with high shock and sheer strength.

D. WHEELS, PULLEYS, GEARS...
Noiseless...high impact strength...immune to acids, oils and moisture.

PLASTICS DIVISION
MOLDED PRODUCTS CORPORATION
..Pace-Makers in Plastics Molding

FREE "Data Book of **MPc** Facilities," an engineering-eye view of **MPc** press capacities and other production facilities...together with a survey of **MPc** special skills available for your use. *Write for your copy.*

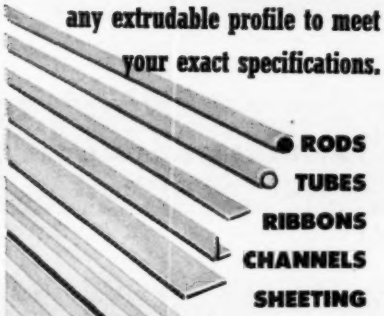
Challenge Clopay Plastics to do your job!

Clopay research has made revolutionary progress in the development of precision plastics with material characteristics of the widest versatility.

Clopay facilities and new compounding techniques offer new opportunities in the engineering of

POLYVINYL CHLORIDE
ACETATE
POLYSTYRENE
ACETATE-BUTYRATE
ACRYLICS
HIGH-IMPACT
HIGH STYRENE COPOLYMERS

Thermoplastics in any extrudable profile to meet your exact specifications.



RODS
TUBES
RIBBONS
CHANNELS
SHEETING

Round, flat or unusual shapes in a complete range of colors . . . low and high temperature properties . . . hard or soft with required degree of toughness and dielectric strength to meet the most exacting specifications . . . any combination to satisfy difficult requirements for gaskets, mouldings, tubing, electrical insulation and other uses. Clopay Vinyl extrusions are an authentic improvement over rubbers (natural or synthetic) not a substitute.

For specific information write, wire, or phone . . .
INDUSTRIAL PRODUCTS DIVISION

CLOPAY corporation

Clopay Square, Cincinnati 14, Ohio, DUnbar 4800
New York: 386 Fourth Avenue, Rm. 608—Murray Hill 3-8066
Chicago: 30 N. LaSalle Street—CEntral 6-4418
Cleveland: 428 Union Building, 1836 Euclid—MAin 1-4381
Detroit: 814 Fisher Building—TRinity 1-4262
St. Louis: 4356 Maryland Avenue, Rm. 204—JEfferson 6369

CHECK THESE CLOPAY SERVICES

☐ **1.** Fabrication of Vinyl film, supported and unsupported, and Polyethylene film for specialized uses.

☐ **2.** Vinyl coating and embossing of papers and textiles.

☐ **3.** Multi-color printing (surface and rotogravure) for decorative uses and military wrapping and packaging.

☐ **4.** Manufacture of Vinyl Inks.

☐ **5.** Precision fabrication of extruded and molded parts.

☐ **6.** Precision slitting, electric-eye controlled cutting, die-cutting, electronic and thermal sealing, and high speed production line sewing of plastics.

☐ **7.** Manufacture of cast Vinyl film for applications where uniform high strength and dielectric properties are required.

☐ **8.** Complete Laboratory and Engineering facilities for research and development.

WATERTOWN MFG. CO. SUCCESS

JC 64 oz pre-plasticizing

40 SECOND CYCLE

*500 SQ. INCHES PROJECTED

PRE-PLASTICIZES OVER

800 TONS LOCKING

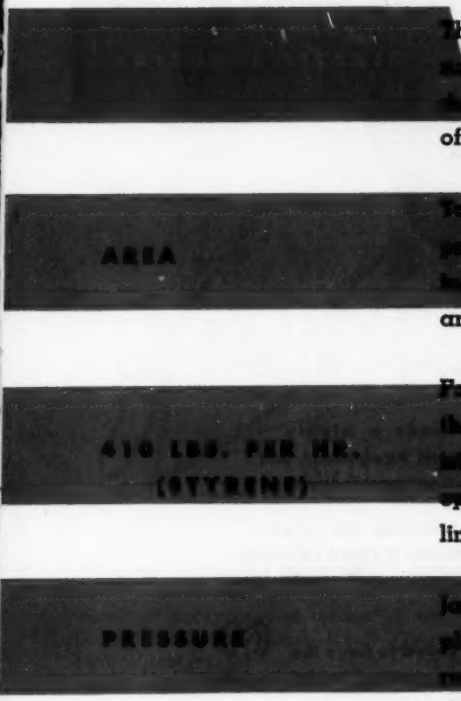
Mr. E. E. Beadle, superintendent of the Molding Department, and Mr. Frank Mazzola, department foreman, of the Watertown Mfg. Co., Watertown, Conn., inspecting a refrigerator tray produced by the Watertown Mfg. Co. on their J-C 64 oz. pre-plasticizing press.

In speaking of their J-C 64 oz. pre-plasticizing press, Mr. Beadle says: "We use the J-C press for the custom molding of large thermoplastic parts on a production basis. The J-C machine's ease of operation, short cycle time, uniform pre-plasticizing make it ideally suited to our operations."

SPECIFICATIONS — 64 OZ. PRE-PLASTICIZING PRESS

pressure p.s.i. on material in injection chamber	12,000 p.s.i.	speed of opening	450" per min. slowed down for knock-out
diameter of plunger	3¾" diameter	max. overall height	19' 10" to 21' 6"
diameter of screw	4½" diameter	max. daylight opening	36" to 64"
speed of screw	25 to 200 r.p.m.	min. daylight opening	9" to 38"
stroke of clamp cylinder	27" min. 36" max.	distance between tie rods	left to right 36" right to left 36"
speed of closing	350" per min. slowed down to 60" per min. for clamping	floor space required	102 square feet
		approximate weight	80,000 pounds

PROVES AGAIN . . .
Press answers the needs of the Custom Molder



The Watertown Mfg. Co. of Watertown, Conn., "a name as old as the plastics industry," has been producing precision moldings since 1915, and was one of the first to acquire a production machine.

Today, Watertown is among the nation's leaders in the production of such large thermoplastic custom moldings as panels, cabinets and housings for consumer and military products.

For the injection molding of just such custom moldings, the Watertown Mfg. Co. chose the J-C 64 oz. pre-plasticizing press. The J-C 64 oz. pre-plasticizing press offers opportunities unlimited—with mold design the only limiting factor.

Jackson & Church is proud to serve the pioneers in the plastics industry with the presses that make tomorrow's products . . . available today!

Dependent upon part design, mold design and material

Hendry PRE-PLASTICIZING PROCESS JACKSON & CHURCH CO JC Saginaw Michigan

A PRODUCT OF

JACKSON & CHURCH CO. • SAGINAW, MICHIGAN

WORK WELL DONE SINCE '81

Glowing translucent color

Veni-Plex translucent slats, Veni-Plex Corp. of America.

fresh as a flower

with Koppers Polystyrene

In the home . . . in the office . . . VENI-PLEX Venetian Blinds have added a new decorative note to the traditional convenience of venetian blinds. Veni-Plex Venetian Blinds have a remarkable translucence without being in any degree transparent. A small percentage of outside light filters through the slats, diffusing a glow of fresh, radiant color that adds to interior beauty. The luminosity of Veni-Plex Blinds is due to the fine inherence of color in Koppers Polystyrene 8X.

Color control and stability in the plastic material was of primary importance in planning these venetian blinds, because a variety of shades was required. Made of Koppers Polystyrene, Veni-Plex Venetian Blinds are available in nine attractive colors which cannot chip, peel or fade. They retain their beauty indefinitely.

The dimensional stability and high heat resistance of Koppers Polystyrene made the extrusion and forming operations of Veni-Plex Blinds possible. The material is made up in rolls for easy shipment; then individual slats are cut from the rolls and formed into blinds. The finished product is feather light, and entirely without metallic clatter.

We welcome your inquiries as to the suitability of Koppers Polystyrene for your product applications. Technical data on the properties of Koppers Polystyrenes are available upon request.

As always, we want to work with you to obtain the best results from your use of Polystyrene . . . and to assist you in the design of new products to be made from Koppers Polystyrene.

Koppers Plastics have made Many Products Better and Many Better Products Possible.

KOPPERS

KOPPERS COMPANY, INC., Chemical Division, PITTSBURGH 19, PA.

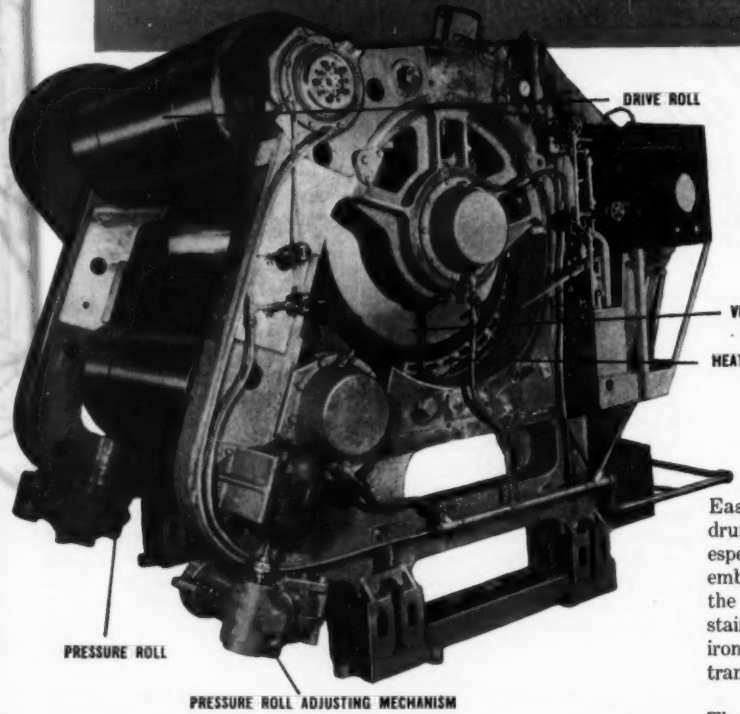
SALES OFFICES: NEW YORK · BOSTON · PHILADELPHIA · CHICAGO · DETROIT · LOS ANGELES

A completely new and redesigned

FOR CONTINUOUS

Permits roll and belt

A NEW ROTOCURE, DESIGNED TO GREATLY FACILITATE REMOVAL OF THE VULCANIZING DRUM AND REPLACEMENT OF THE STEEL BAND, IS NOW AVAILABLE AS A RESULT OF COOPERATIVE ENGINEERING BY ADAMSON UNITED COMPANY AND BOSTON WOVEN HOSE AND RUBBER COMPANY



Easy removal of the Vulcanizing drum to make quick roll changes is especially important when use of an embossed curing roll is necessary, as in the production of floor matting and stair treads. The changing of edge irons when producing conveyor or transmission belting is also facilitated.

The pressure (gauging) roll will withstand a separating force of 250,000 pounds per adjusting screw. It is contemplated that certain stocks can be calendered and cured in a single operation, gauging being accomplished between the pressure roll and the curing roll.

ADAMSON UNITED COMPANY

AKRON 4, OHIO

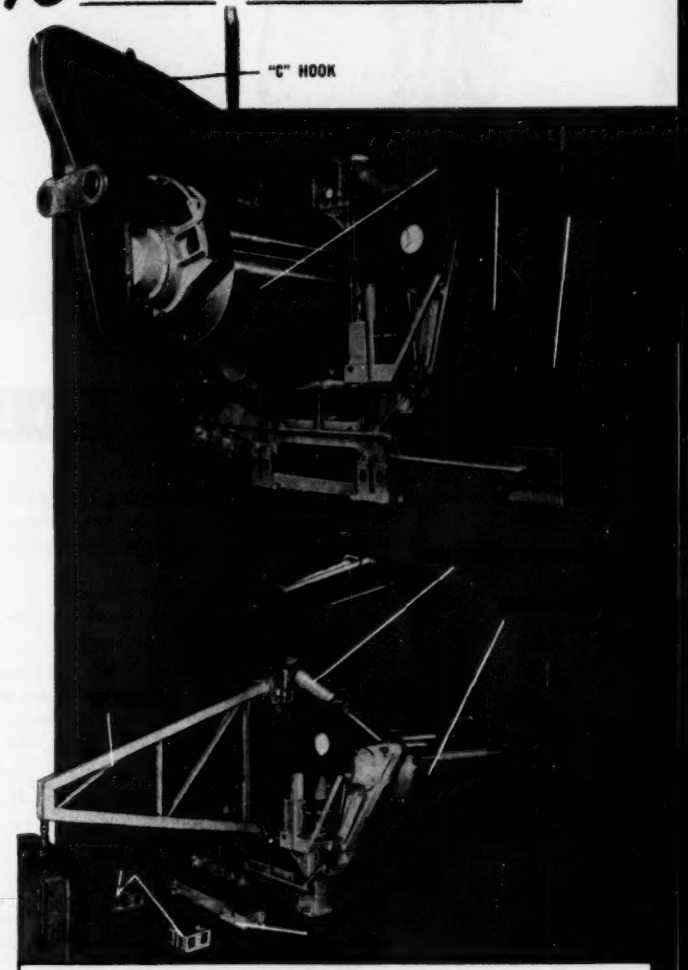
SUBSIDIARY OF UNITED ENGINEERING & FOUNDRY COMPANY

BRANCH OFFICES IN PRINCIPAL CITIES

ROTOCURE*

VULCANIZATION

changes in 1/10th the time!



One piece housings provide adequate "window" clearance for removal of the curing roll. A special "C"-Hook is furnished for supporting the roll as illustrated. All design details have been engineered to facilitate and speed roll changing. For example, all supply and return lines are quick-disconnect type. The heating shoes surrounding the Vulcanizing roll are automatically retractable.

Some desirable features:

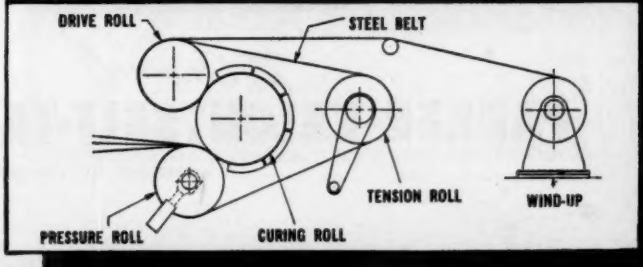
- **All rolls are supported in self-aligning roller bearings, oil flood lubricated.**
- **Speed range is adjustable from ½ to 6.2 feet per minute.**
- **Vulcanizing roll is 60" diameter; 80" face.**
- **Tension roll is hydraulically actuated; maximum belt tension, 240,000 pounds.**

Easy replacement of the steel band is made possible by the ingenious arrangement illustrated. After the curing roll has been removed, the specially provided "A-Frame" is bolted in place and jacked up far enough to remove the weight from the base rail on the near side. The two "foot blocks" are then taken out, permitting the belt to be removed through the resulting opening.

Operation of the Rotocure is shown schematically at right. The Rotocure has many advantages over the conventional press on large production runs. For example:

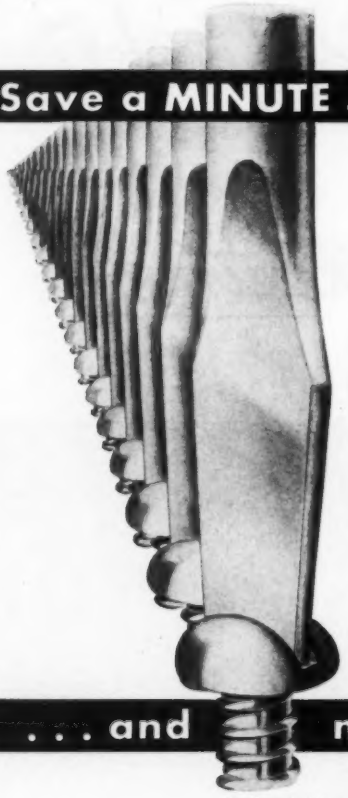
- **Increased production provided by continuous operation, which eliminates opening, cooling, reheating and closing.**
- **Elimination of overcuring and undercuring of the over-lap areas occurring on conventional presses.**
- **Greater uniformity of stretch.**

Our engineers are available for consultation concerning the possibilities of the Rotocure for your particular products.



**The Rotocure machine is a patented development of Boston Woven Hose and Rubber Company built by Adamson United Company under a licensing arrangement.*

Save a MINUTE . . .



here...

BOLTS, NUTS AND LOCK WASHERS

here...

MACHINE SCREW IN TAPPED HOLE

here...

RIVETING IN HARD-TO-REACH PLACES

here

MACHINE SCREW IN THREADED INSERT

. . . and multiply it by MILLIONS!

A simple idea — Self-tapping Screws — originated 35 years ago by Parker-Kalon — becomes more important to industry every day.

The idea is simple—hardened screws that will drive into metal or plastics just as wood screws drive into wood—to save the time and equipment required for tapping, riveting, and nut-running.

But its accomplishment is far from simple. The foundation of P-K leadership was its success in mastering the difficult problem of mass-producing screws possessing the proper balance of hardness and toughness. It is the reason the names Parker-Kalon and Self-tapping Screws are synonymous today.

IF IT'S P-K IT'S O.K.

Your savings with P-K Screws—at each fastening point—are measured in minutes or less. But these minutes—multiplied by millions of fastenings—mount rapidly. They *total* a big saving—a saving you can't afford to overlook with production demands soaring, production costs at an all-time high, and with a squeeze on profits.

Why not let a P-K Assembly Engineer help you to plan your DO, or other assemblies, in order to take full advantage of the *economical* Self-tapping method? Parker-Kalon Corporation, 200 Varick Street, New York 14, New York. Sold through Accredited Distributors.

The Original

PARKER-KALON® SELF-TAPPING SCREWS

A TYPE AND SIZE FOR EVERY METAL AND PLASTIC ASSEMBLY

Uniform Results—you'll get them with Pittsburgh PX Plasticizers, too!

You're always sure of the "pedigree" of Pittsburgh PX Plasticizers. For, as a basic and integrated producer of vital coal chemicals such as phthalic anhydride, benzene and xylene, we have the important advantage of controlling and maintaining the high *quality* and *uniformity* of our plasticizers from coal to finished products. And that advantage benefits you in three important ways: in dependable, continuing supplies . . . in better performance and ease of use in your formulations . . . and in finished products that are more durable and useful.

Today, you'll find more and more coal chemical products of the Pittsburgh Coke & Chemical Company at work in both peacetime and military production . . . products that are recognized above all else for their *dependability.*

PX-104 ____ DiButyl Phthalate
PX-108 ____ DilsoOctyl Phthalate
PX-138 ____ DiOctyl Phthalate
PX-208 ____ DilsoOctyl Adipate
PX-404 ____ DiButyl Sebacate
PX-408 ____ DilsoOctyl Sebacate
PX-658 ____ TetraHydroFurfuryl Oleate
PX-917 ____ TriCresyl Phosphate

WAD 3931

P C & C

PITTSBURGH
COKE & CHEMICAL CO.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

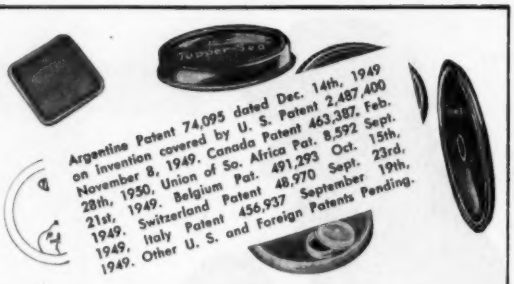
Tupper Seal, air and liquid tight flexible covers fit, and are included in the sets of all Tupperware Canisters.

The Tupperware 50 oz. Canister is "standard equipped" with the Tupper Seal, air and liquid-tight flexible Pour All cover.

The Tupper Seal, air and liquid-tight flexible Pour All cover is used on every Tupperware 20 oz. Canister.

The Tupper Seal, air and liquid-tight, Pour All cover as a cover for 46 oz. cans; Tupperware Sauce Dishes and other containers of metal, glass or pottery. Foods easily dispensed without removing entire cover.

The Tupperware Wonder Bowls are usually fitted with Tupper Seal, air and liquid-tight covers.



Argentine Patent 74,095 dated Dec. 14th, 1949 on invention covered by U. S. Patent 2,487,400 November 8, 1949. Canada Patent 463,387, Feb. 28th, 1950. Union of So. Africa Pat. 8,592 Sept. 21st, 1949. Belgium Pat. 491,293 Oct. 15th, 1949. Switzerland Patent 48,970 Sept. 19th, 1949. Italy Patent 456,937 September 19th, 1949. Other U. S. and Foreign Patents Pending.

TUPPER! Seals

air and liquid-tight, flexible covers for Tupperware Tumblers, Canisters, Wonder Bowls, Cereal Bowls and many another container of glass, metal and pottery, the contents of which it is desired to keep fresh and wholesome.

FORMAL NOTICE! 9th November, 1949

EXCLUSIVE!

U. S. Patent #2,487,400

The Tupper Corporation has attained a position of leadership in this industry by incurring great expense and expending painstaking effort in the development, design, manufacture and exploitation of its many world-known products.

The Tupper Corporation further has anticipated the inevitable attacks to which leadership is subject and has taken measures provided by law to preserve the creative rights to its products, methods and design by patent protection both in the United States and abroad.

Tupper Seals for Tupperware shown in this advertisement are just a few of the forms covered in this manner and are specifically covered by U.S. Patent #2,487,400.

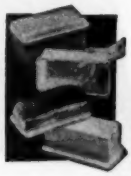
Only the Tupper Corporation, by U.S.Patent #2,487,400 has the right to make, use and vend container closures in connection with any and all types of containers throughout the United States and its territories as covered by the claims of the Patent.

Tupper Corporation will protect, according to law, the exclusive rights above granted

TUPPER CORPORATION

There's a Tupper Seal, air and liquid-tight flexible cover for Tupperware 2, 5, 8 and 12½ oz. Tumblers too, and these Tupper Seal, covers fit many other containers of metal, glass and crockery.

The Tupper Seal, air and liquid-tight flexible Por Top cover, specially designed as a dispensing cover for specified diameters of containers holding foods such as syrups, salad dressings, catsup.



The cover of the Tupperware Bread Server which serves as a bread tray also is designed to give similar results as Tupper Seal, air and liquid-tight Flexible covers. Keeps contents fresh as no other such container.

When equipped with Tupper Seal, air and liquid-tight, flexible covers, Tupperware Cereal Bowls serve many another purpose.

The Tupper Seal, air and liquid-tight flexible cover made for Tupperware 8 oz. Tumblers also fits and is sold with all Tupperware Funnels as a base when funnels are used as storage containers.

TUPPER CORPORATION

Manufacturers of — CONSUMER, INDUSTRIAL, PACKAGING AND SCIENTIFIC PRODUCTS

FACTORIES: Farnumsville, Mass., and Cuero, Texas **New York Show Rooms 225 Fifth Ave.**

ADDRESS ALL COMMUNICATIONS TO: Department B

injection molding machines

DE MATTIA

—the standard of MOLDING EFFICIENCY

The De Mattia Model C-1, illustrated, incorporates the ultimate in design and performance in injection molding machines. Exceptionally heavy tension members, high mold clamping pressure and uniform hydraulic pressure on the entire die face are just a few of the many De Mattia features that increase molding efficiency. Like all De Mattia equipment, Model C-1 is ruggedly constructed to provide long service in continuous use — the kind of service that has made the name De Mattia a standard for reliability throughout the industry.

DE MATTIA HORIZONTAL MODEL C-1 SPECIFICATIONS

Material per Injection — 12 ozs. • Plasticized Material per hour — 130 lbs. • Feed Hopper Capacity — 60 lbs. • Injection Piston Diameter — 2¾" • Injection Piston Stroke — 11½" • Hydraulic Injection Cylinder Bore — 13" • Pressure on Material — 22,500 PSI • Mold Closing Pressure — 400 Tons • Max. Mold Size — 18" x 25" • Max. Daylight — 30" • Min. Die Space — 6" • Max. Stroke — 24" • Oil Pump Capacity — 60 GPM @ 1000 PSI, Max. • Motor — 30 HP • Injection Stroke Time, for Filling Mold — 3.0 Secs. • Speed of Injection Piston, Forward — 120" per Min. • Heating Cylinder — 13,000 Watts • Height of Machine, Overall — 72" • Floor Space Required — 172" x 42" • Approx. Weight — 10 Tons.

SEND FOR NEW DE MATTIA CATALOG

It contains complete information and specifications on De Mattia Horizontal and Vertical Molding Machines and De Mattia Scrap Grinders.

MOLDING PRESSES • SCRAP GRINDERS • MOLD MAKING

DE MATTIA MACHINE and TOOL CO.

DE MATTIA MACHINE and TOOL CO.

NEW YORK SALES OFFICE: 50 CHURCH ST. — CABLE ADDRESS: BROMACH, N. Y.
MIDWEST SALES OFFICE: 189 WEST MADISON ST., CHICAGO 2, ILLINOIS

These features make MYSTIK Self-Stik Labels the fastest, best hand labels you ever used

The outstanding qualities of Mystik Self-Stik Labels are due to the heavy saturation of rubber in the base stock and the strongly bonded rubber adhesive, providing strength, flexibility, toughness, strong adhesion and ease of handling. Let us suggest a Mystik Self-Stik Label to solve one of your hand labeling problems. Write for full information and samples. Chicago Show Printing Co., 2669 N. Kildare, Chicago 39; 400 Madison Ave., New York.

CHICAGO SHOW
PRINTING COMPANY
CHICAGO • NEW YORK

MOSLO *Minijectors*

MOSLO UNIVERSAL MINIJECTOR

MOSLO DUPLIMATIC MINIJECTOR

High Speed PRODUCTION *Low Cost* OPERATION

Want *volume* injection molding with low die expense? Then investigate these small high-speed Moslo Minijectors—which in hundreds of cases are out-performing larger machines in turning out small molded pieces or parts. Every Minijector is built for lasting service and will provide economical, efficient, automatic operation.

MOSLO DUPLIMATIC MINIJECTOR—especially for insert molding of cord-plugs, switch parts, etc. A two-sided self-positioning lower mold section allows operator to remove finished molded part from the mold section and refill with new inserts while the other mold section is in cycle. Automatic hydraulic operation provides for complete operator safety. Mold casting area 40 square inches. Injection pressure 20,000 p.s.i. Injection capacity to 4 oz.

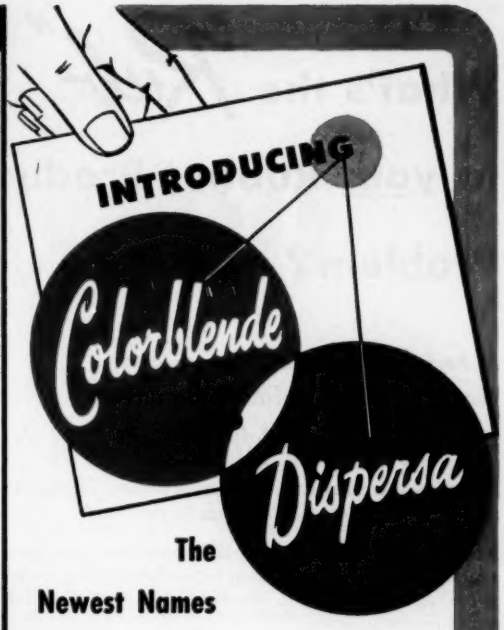
MOSLO UNIVERSAL MINIJECTOR—A versatile, high-speed molding machine of up to 4 oz. capacity. Universal mold-clamp assembly readily accessible to operator allows mold to be changed in minimum time. Fully automatic hydraulic operation. Injection pressure 16,250 to 20,000 lbs. p.s.i. Casting area 30 to 60 square inches.

It will pay you to write today for complete information.

TERRITORIES OPEN FOR DISTRIBUTORS

MOSLO ENTERPRISES

MOSLO MACHINERY COMPANY
2443 PROSPECT AVENUE • CLEVELAND 15, OHIO



The Newest Names In

Dry Colorants

Mid-America Plastics, Inc., is operating its Dry Color Division under full production. A completely equipped laboratory and modern manufacturing facilities formulate and compound "Colorblende" the dry colorant, and "Dispersa" the wetting agent. You can get immediate delivery of "Colorblende" in 17 Bureau of Standards colors or specify any special colors.

We invite your inquiry—write today for our price list and Color Comparison Chart. Upon request we will send without charge a sample of any standard color of your choice. "Colorblende" and "Dispersa" are packaged in convenient containers — in 50# or 100# units ready to color your crystal styrene in any mixing drum.

Quick — Easy — Dust Free — Economical

TERRITORIES OPEN FOR DISTRIBUTORS

MID-AMERICA PLASTICS, INC.
COLOR DIVISION
2443 PROSPECT AVE. • CLEVELAND 15, OHIO

What's the "Rub" in your Rubber Products Problem?

...Perhaps Flintkote Research and Development have found the answer to your special needs, too!

Sometimes, in adhesives, coatings or sealers, *just a little difference makes all the difference in the world.*

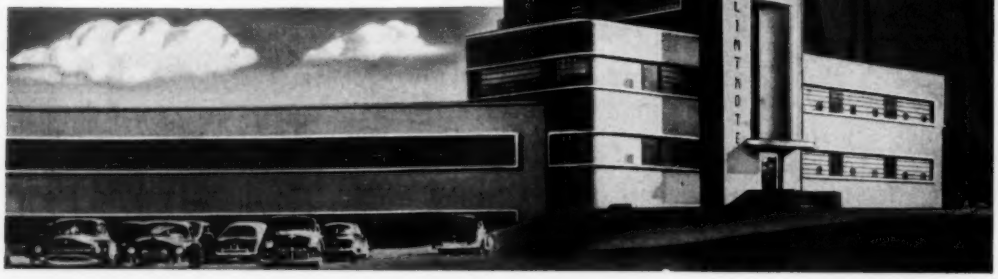
And, finding that important difference may give you exactly what you are looking for in fabricating, compounding or processing. We have done just that for many manufacturers.

But first of all, investigate Flintkote's wide line of both aqueous and solvent types of compounds: cements, sizings, laminates, saturates, coatings and sealers. We may well have the product you need.

If not, if your requirements *do* turn out to be extra special—our trained research staff will welcome the opportunity to work with you—whether you want drum or carload quantities . . . rubber and resin formulations. Simply *write:*

THE FLINTKOTE COMPANY, *Industrial Products Division*
30 Rockefeller Plaza, New York 20, N. Y.
Atlanta • Boston • Chicago Heights • Detroit • Los Angeles
New Orleans • Washington
The Flintkote Company of Canada, Ltd.
30th Street, Long Branch, Toronto, Canada

FLINTKOTE *Products for Industry*



FLINTKOTE RESEARCH LABORATORY

some things you will want to know about this new low-cost vinyl plasticizer

what it is

MPS-500 is a stabilized, chlorinated ester of a fatty acid, in which the chlorine content is controlled to give best balance between compatibility and plasticizing efficiency.

its chief advantages

MPS-500 is lower in cost than most primary plasticizers. It shows excellent compatibility with vinyl chloride polymers and copolymers, is highly permanent and flame retardant.

qualities it can impart to your product

- Flame retardance
- High resistance to water, oil, gasoline
- High permanence on heating
- Excellent electrical properties
- High tensile strength at high flexibility
- Low migration

what you can use it for

- Transparent and opaque films
- Upholstery and drapery
- Shoe soles
- Electrical insulation
- Hose covering
- Organisol and Plastisol formulations
- Softener for nitrile rubbers

BULLETIN 35 gives you properties of MPS-500; comparisons with other plasticizers; detailed test data; typical formulations and uses. Write today, on your company letterhead, for a copy.

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

18 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.
NEW YORK, N. Y. • WILMINGTON, CALIF. • TACOMA, WASH.

HOOKER CHEMICALS

1-865

BENZOIC ACID • CHLOROTOLUENE • SODIUM BENZOATE • CAUSTIC SODA • MURIATIC ACID • CHLORINATED PARAFFIN • CHLORINE

GE Plastics News

MOLDING COMPOUNDS • LAMINATING & INDUSTRIAL RESINS

FASTER CURES NOW POSSIBLE

in *both* compression and transfer molding with this *NEW* G-E COMPOUND

General Electric's versatile new general-purpose compound, G-E 12853, is designed to help you get minimum cure times whether you are molding by compression, plunger or transfer methods.

Its unique flow properties often make it possible for you to use only *one* compound for several jobs—give you an opportunity to simplify your inventory.

Parts molded from G-E 12853 have a glossy finish with excellent electrical and mechanical properties. By choosing the proper flow and molding temperatures, you may obtain cure reductions similar to the ones listed below.

Tube bases have been produced with a 40% saving in cure time compared with conventional methods—thanks to G-E 12853 general-purpose compound.

MOLDING METHOD	MOLDED PART	CURE TIME REDUCTION
Compression	Radio cabinet	16%
	Tube socket	25%
Plunger	Cooker handle	17%
	Tube base	40%
Transfer	Flatiron handle	34%

Write today

for more information and samples of this versatile new molding compound to Section J-6, Chemical Division, General Electric Company, Pittsfield, Massachusetts.

There's MORE for the MOLDER in General Electric's complete line of thermosetting plastics compounds.

GENERAL ELECTRIC

PROTECT
your vinyl plastics AGAINST BOTH LIGHT AND HEAT ...with these "Dutch Boy" Stabilizers

1. "DUTCH BOY" DYPHOS

Dibasic Lead Phosphite. **The outstanding heat and light stabilizer for vinyl chloride polymers and copolymers. Dyphos is unexcelled in providing protection against the deleterious effects of *both* heat and light. Gives a useful life at least twice that of similar compounds using other stabilizers.**

The remarkable effectiveness of Dyphos makes it possible to utilize chloroparaffins as low cost flame-resistant secondary plasticizers in quality products. Dyphos is also highly effective in plastisols and organosols.

2. "DUTCH BOY" TRIBASE
Tribasic Lead Sulphate plus
"DUTCH BOY" DS-207
Dibasic Lead Stearate

The popular combination for good, all-around performance. Combines heat stability, light fastness and lubricity in processing.

3. "DUTCH BOY" DYTHAL

Dibasic Lead Phthalate. **An excellent absorber of ultra-violet light, Dythal promotes light fastness in organic films. This advantage, combined with rugged heat stability derived from the basic character of this compound, makes Dythal the *general purpose stabilizer.***

"Dutch Boy" Stabilizers

PRODUCT	USE
TRIBASE (Tribasic Lead Sulphate)	Electrical and other compounds requiring high heat-stability
TRIBASE E (Basic Lead Silicate Sulphate Complex)	Low volume cost insulation
DS-207 (Dibasic Lead Stearate)	Stabilizer-lubricant for sheeting, film, extrusion and molded compounds
PLUMB-O-SIL A (Co-precipitate of Lead Orthosilicate and Silica Gel)	Translucent and colored sheeting and upholstery stocks
PLUMB-O-SIL B (Co-precipitate of Lead Orthosilicate and Silica Gel)	Translucent and colored film, sheeting, belting
PLUMB-O-SIL C (Co-precipitate of Lead Orthosilicate and Silica Gel)	Highly translucent film and sheeting
DYTHAL (Di-basic Lead Phthalate)	General purpose stabilizer for heat and light. Good electrical properties
DYPHOS (Di-basic Lead Phosphite)	Outstanding for heat and light in all opaque stocks, including plastisols and organosols
NORMASAL (Normal Lead Salicylate)	As stabilizer or co-stabilizer in vinyl flooring and other compounds requiring good light-stability

Accelerated tests in the laboratory, plus actual use tests, show that Dyphos, Dythal, and Tribase — DS-207 increase, tremendously, the useful life of plastic compounds.

For example, a compound containing Dyphos withstood over 2000 hours in the Weatherometer before failure.

"Dutch Boy" Stabilizers are a product of National Lead Company.

Our technical staff will help you stabilize vinyl resins for any use. Write for complete information.

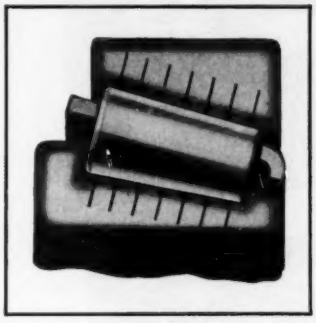
Dutch Boy* CHEMICALS

*Reg. U. S. Pat. Off.

NATIONAL LEAD COMPANY

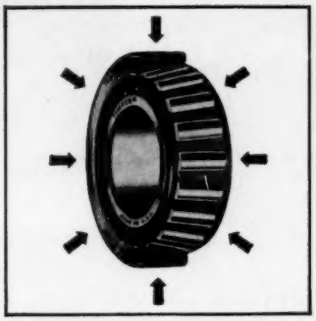
111 Broadway, New York 6, N. Y.

What's your bearing problem?



HEAVY LOADS?

In Timken® bearings the load on rollers and races is spread evenly over a line of contact. The greater load area means extra load-carrying capacity.

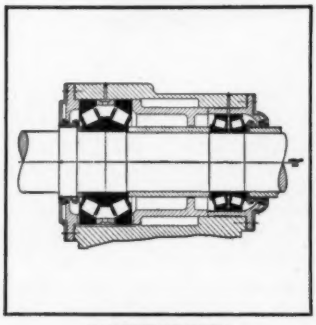


COMBINATION LOADS?

Because they're tapered in design, Timken bearings carry both radial and thrust loads. Auxiliary thrust bearings or plates are eliminated.

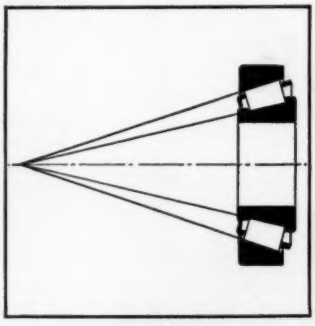
PRECISION?

Timken bearings hold shafts in alignment. Gears mesh with precision, assuring a smooth flow of power. Deflection is minimized, end-movement prevented.



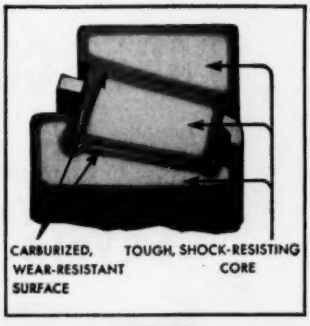
MAINTENANCE?

Closures are more effective because Timken bearings keep housing and shaft concentric. Dirt and grit are kept out, lubricant kept in. Maintenance time is cut to a minimum.



FRICTION?

Timken bearings roll freely due to true rolling motion. All lines coincident with the tapered surfaces of the rollers and races meet at a common point on the bearing's axis.



WEAR?

Rollers and races of Timken bearings are made of Timken fine alloy steel—case hardened to give them a hard wear-resistant surface and a tough shock-resisting core.

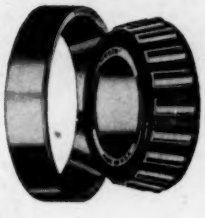
TIMKEN® bearings solve them all!

Be sure to specify Timken roller bearings for the machines you build or buy. Look for the trademark "TIMKEN" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

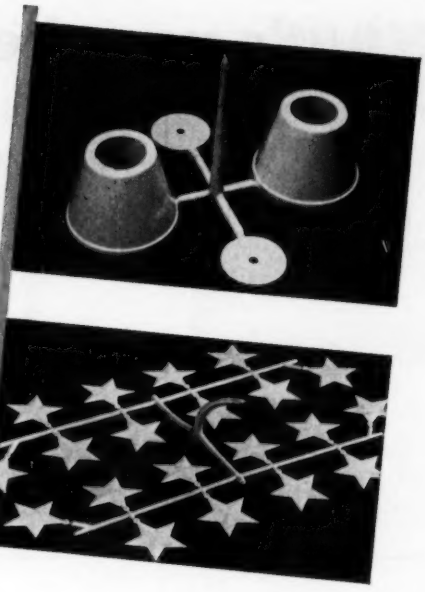
TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ←◫→ LOADS OR ANY COMBINATION ✳

if it's tough to mold . . . . . .

or has to be budget-priced . .



CUT PARTS COSTS with a LEWIS "4"

YOUR large-area, small-shot parts can be molded on a Lewis Model 4 Injection Molding Machine, releasing a high-cost 8-ounce machine to work on larger parts. Cost of operation goes down, less floor space is used per machine, your profit picture looks much better.

The Lewis Model 4 is designed specially to handle large-area parts requiring shots up to 3½ ounces of material. Molds as large as 12" x 23" vertically, or 13⅛" x 20" are readily installed on a Lewis "4."

Multiple-shot injection assures greater uniformity of parts, provides high injection pressures at low plunger pressures.

Exclusive fast-opening crank-operated die-lock mechanism permits rapid clearing of clogged nozzles in as little as 20 seconds.

Minimum floor-space requirements . . . only 16 square feet . . . lets you install a battery of Lewis "4's" almost anywhere, help cut your operating overhead. Operation is quiet, can be automatic if you desire.

Any material from nylon to styrene is molded quickly, economically on a Lewis "4."

Get facts and specifications today. Address:

LEWIS

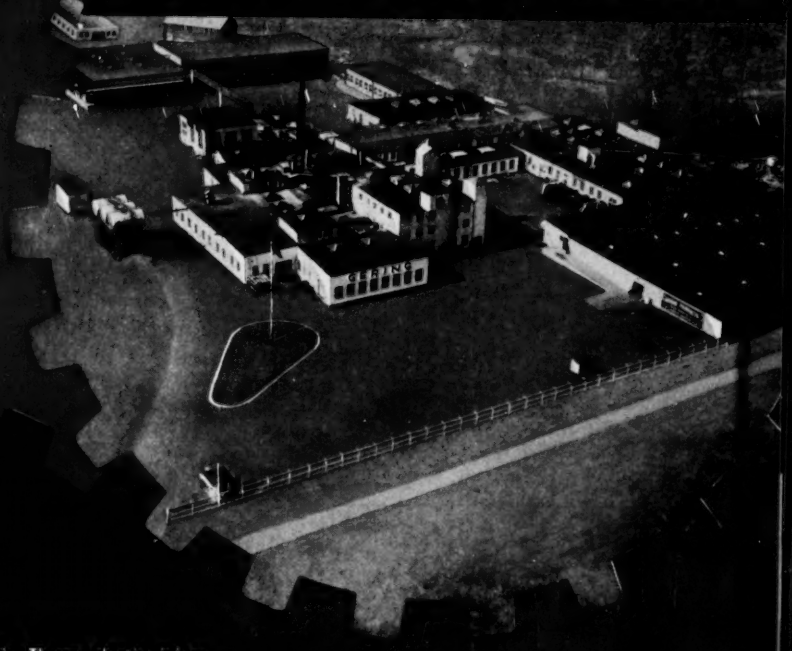
THE LEWIS WELDING AND ENGINEERING CORP.

1 Interstate Street • Bedford, Ohio

Gering is Geared TO SERVE THE ENTIRE PLASTICS INDUSTRY

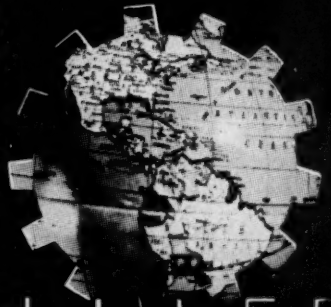
a complete **PLANT**

for a complete **SERVICE**



- **WE MANUFACTURE** Virgin Thermoplastic injection and extrusion molding compounds, standard and special formulations . . . Polystyrene, Polyethylene, Acetate, Butyrate, Ethyl Cellulose, Vinyls, Acrylics.
- **WE BUY THERMOPLASTIC SCRAP** — all types and forms: Polystyrene, Vinyls, Nylon, Ethyl Cellulose, Polyethylene, Acetate, Butyrate, Acrylics.
- **WE CUSTOM COMPOUND** your materials, and offer these special services: Sorting, De-contaminating, Color-Matching, Pelletizing.
- **WE EXTRUDE** any flexible or rigid formulation which you plan, for any special-shaped Belting, Binding, Edging, Rods, Tubes, Film, Strips . . . in Polystyrene, Cellulose Acetate, Polyethylene, Vinyl, Butyrate, Ethyl Cellulose, Acrylics.

DRYCOL —offered as Gering's perfected dry coloring medium for in-plant coloring of ALL PLASTICS. No special skill or equipment needed. Standard, Special and Metallic colors available or to order.



GERING *Products*

Polystyrene going in ...metal coming out

IN HIGH VACUUM a film of aluminum .000005″ thick is about to be deposited on a load of transparent polystyrene plaques.

After they emerge from this 48-inch DPi Vacuum Coater at the Plastics Division of General American Transportation Corporation, the backs will get an over-all protective lacquering, and through the front expensive-looking, silvery letters will spell out the name of a famous make of refrigerator—ready to withstand thousands of scuffs by busy housewives.

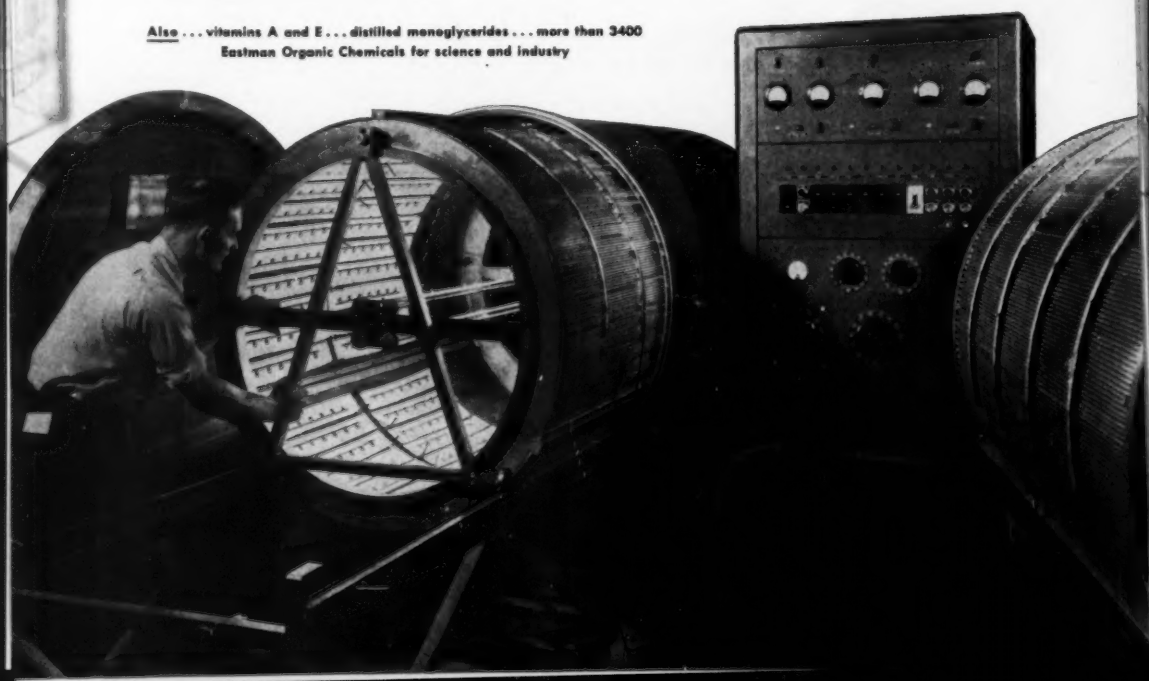
In the booming art of vacuum metallizing, this is called "second surface work." Low in cost as it is, there is an even less expensive technique of "first surface work." This means simply that the metal film, with its preparatory undercoat and protective overcoat, goes on the *outer* surface of molded items. The color and clarity of the base material may be whatever today's tight markets will provide, since a beautiful metallic coat will cover it.

DPi makes the most efficient vacuum metallization equipment you can buy and stands ready to work with you in selecting your lacquers and lacquering equipment. We suggest you write for further information to ***Distillation Products Industries,*** Vacuum Equipment Department, 779 Ridge Road West, Rochester 3, N. Y. (Division of Eastman Kodak Company).

DPi

high vacuum research and engineering

Also . . . vitamins A and E . . . distilled monoglycerides . . . more than 3400 Eastman Organic Chemicals for science and industry



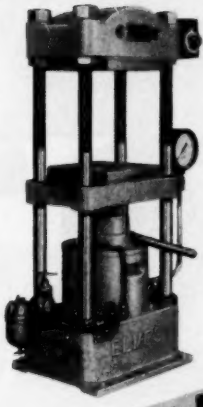
Big Results

FROM small LOW-COST ELMES PRESSES

ELMES HYDROLAIRS®

50-TON FLOOR MODEL

This model can be equipped for semi-automatic pushbutton operation as illustrated.



ELMES SMALL PRODUCTION AND LABORATORY PRESSES

30-TON BENCH MODEL

—with air rapid advance.

Quickly Pay for Themselves in Time and Money Saved!

ELMES HYDROLAIRS® bring to plastics molders an *exclusive* Elmes hydraulic principle that *cuts production costs to rock-bottom!* Hydrolairs are small, lightweight, inexpensive presses—fast, full power-operated, with continuous high-pressure stroke—*yet without the usual motors and pumps.* Hydrolairs take their power entirely from the shop air line. The pressure you select is automatically applied and maintained, even on compressible materials. Hydrolairs are compact, quiet, easily installed and moved. Supplied as complete, self-contained "packages" with nothing else to buy. Bench models to 30 tons, floor models to 50 tons.

SMALL-PRODUCTION and LABORATORY PRESSES. Powerful small units built to Elmes big press standards, these presses are *valuable aids* to plastics molders. Two types: Laboratory Press (full manual) and Small-Production Press (with power quick-closing). Fast and convenient for checking new dies . . . pre-establishing best combination of heat, pressure, and curing time before starting quantity runs . . . for research . . . and for *actual production.* Built in 20 and 30 ton bench models and floor models to 50 tons. Furnished with or without hot plates and other accessories.

Bulletin 5200-A gives complete details on Elmes Hydraulic Equipment for the Plastics Industry. Contact your Elmes Distributor or write direct for your copy.

ELMES 100th Anniversary 1851-1951 HYDRAULIC EQUIPMENT

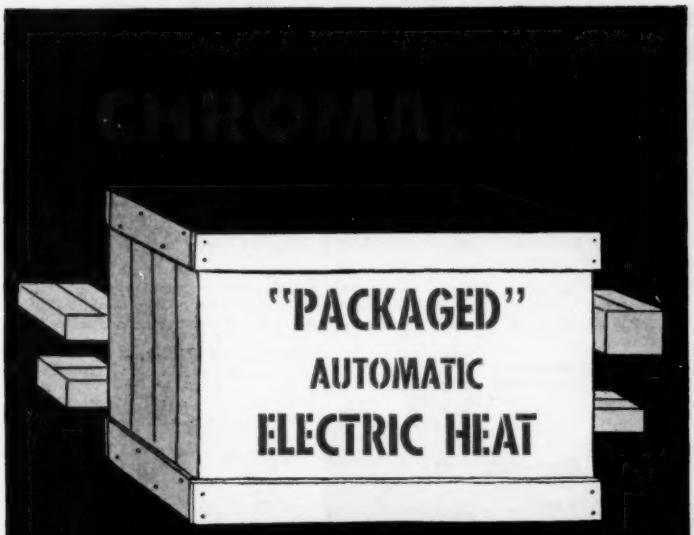
American Steel Foundries

ELMES ENGINEERING DIVISION

1159 TENNESSEE AVENUE CINCINNATI 29, OHIO

DISTRIBUTORS IN PRINCIPAL INDUSTRIAL CENTERS —— ALSO MANUFACTURED IN CANADA

METAL-WORKING PRESSES • PLASTIC-MOLDING PRESSES • EXTRUSION PRESSES • PUMPS • ACCUMULATORS • VALVES • ACCESSORIES



combining Heater and Thermostat in one unit

ready to go on your Jobs!

● CHROMALOX 'Packaged' Electric Heaters are ideal as permanent or portable heat sources in tanks, drums, process kettles and other containers. With CHROMALOX Heaters you can heat accurately and maintain the temperature of degreasing, cleaning, pickling and plating baths. You can melt greases, asphalt and similar viscous fluids. CHROMALOX Units may be had in the types, sizes and wattages required to efficiently do your heating jobs. They are available with sheaths of copper, stainless steel, alloy and lead for resisting the corrosive actions of the solutions you are using.

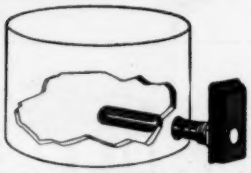
Nation-wide engineering service for on-the-job assistance and recommendations. Write, wire or phone for the name of the Chromalox Engineering Representative serving you.

CHROMALOX

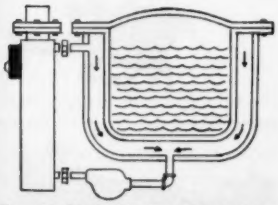
Electric Heat for Modern Industry

Variety and Versatility to fit your Needs Exactly

Chromalox Immersion Heaters with built-in thermostats for portable or permanent use. Drawing illustrates Immersion Units, equipped with sludge-legs, installed over the side of the tank for direct heating. Available in various metal sheaths to resist the corrosive action of the liquid compounds.



Compact, thermostatically controlled, screw-in type Chromalox Immersion Unit is easily installed in smaller tanks and other containers. Thermostat range is 100° to 180° F.



Chromalox Circulation Heaters give accurate, controlled heat up to 750° F. for heating Dowtherm, Aroclor or heat transfer oils. Other uses include water heating applications such as steam boilers and accumulators, kettles, tanks and processing equipment, preheating fuel oils, heating air, nitrogen and other gases; drying steam, plastic powders, etc.

Clip Coupon

For complete details showing how to use Chromalox Heaters in your applications.

Industrial Division — IC-86
EDWIN L. WIEGAND COMPANY
7503 Thomas Boulevard, Pittsburgh 8, Pa.

Please send "100 Ways to Apply Electric Heat" booklet.

Name_____

Address_____

City_____ Zone____

State_____

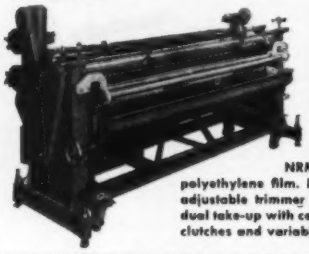
NRM THERMOPLASTICS FILM EXTRUSION EQUIPMENT

for producing film, tubing, and sheeting for packaging

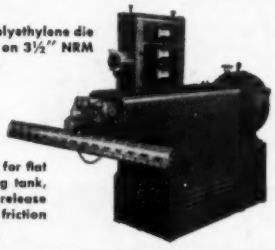
All NRM extruders can be equipped with dies and haul-offs for the extrusion of P.V.C. and polyethylene film and thin-wall expanded tubing.

NRM Haul-off and Wind-up units cool, trim, and wind up polyethylene film at a rate of 250 to 300 pounds per hour . . . have a thickness range of .001" to .010" and can maintain tolerances of plus or minus 5/10%. They are available in 48" and 72" sizes.

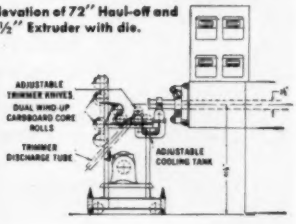
Haul-off and Wind-up sections are powered by a variable speed drive to suit the size of extruder used in connection with the machine. Dies for polyethylene film used with this take-up fit all sizes of extruders and are available complete with heaters and controls.



NRM 72" Haul-off for flat polyethylene film. Includes cooling tank, adjustable trimmer knives, quick release dual take-up with constant tension friction clutches and variable speed drive.

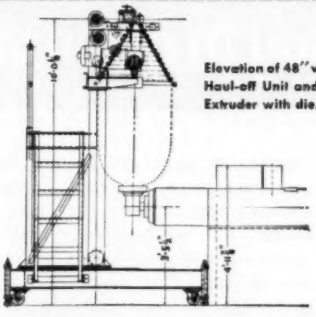


T-type polyethylene die mounted on 3½" NRM extruder.

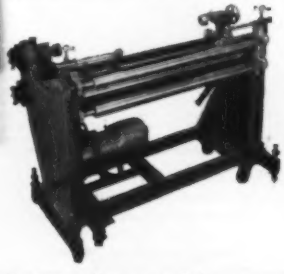


Elevation of 72" Haul-off and 3½" Extruder with die.

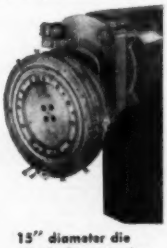
NRM 48" vertical Haul-off for thin-wall expanded P.V.C. and polyethylene tubing. Has variable speed drive, including flattening roll arrangement, adjustable trimmer knives and dual take-up.



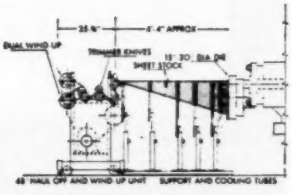
Elevation of 48" vertical Haul-off Unit and 3½" Extruder with die.



NRM 48" Haul-off for P.V.C. sheeting. Includes two water-cooled receiver rolls, adjustable trimmer knives, quick release dual take-up with constant-tension friction clutches, and variable speed drive.



15" diameter die attached to extruder.



Elevation of 48" Haul-off for heavy-gauge P.V.C. sheeting.

The first machine to extrude heavy-gauge polyvinylchloride sheeting (.005" to .015", and a possible .020") produces sheeting with physical quality equal or better than that of sheeting produced by calenders.

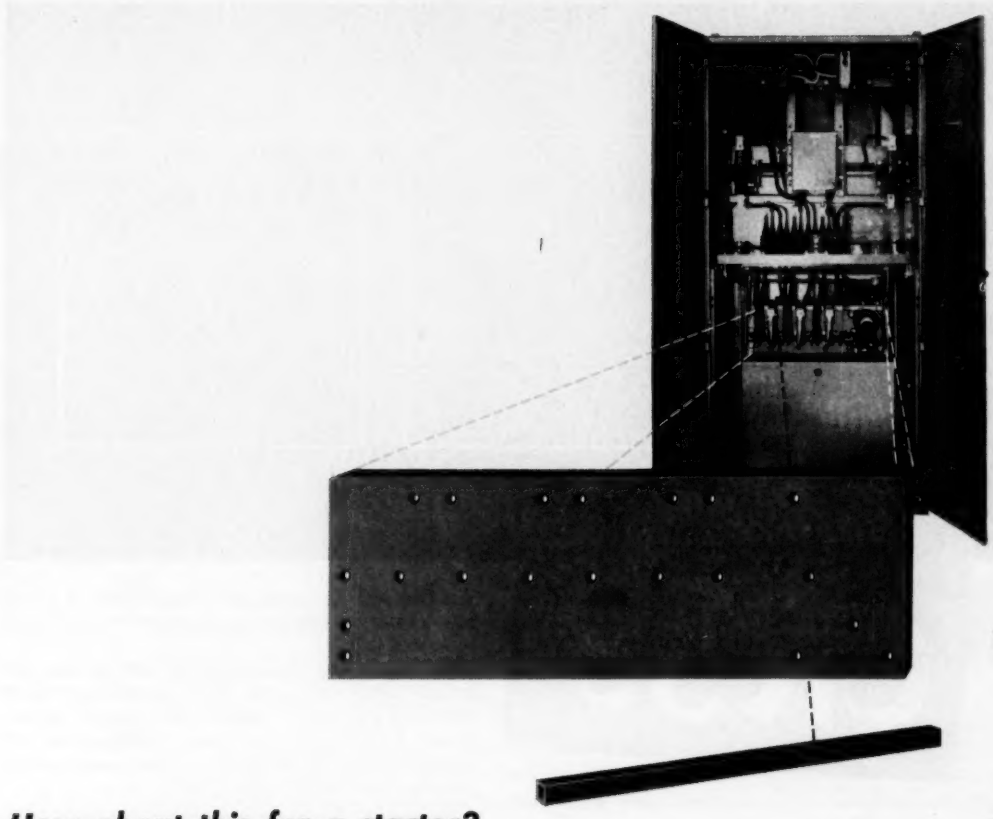
Cost of a complete unit is much less than cost of a calender installation. The economy of the extruder can best be realized on applications where high speed and close tolerances are not imperative.

NATIONAL RUBBER MACHINERY CO.

General Offices & Engineering Laboratories
Akron 8, Ohio

PLANTS at Akron and Columbiana, Ohio and Clifton, N. J.
AGENTS East: National Rubber Machinery Co., Clifton, N. J.
West: S. M. Kipp, Box 441, Pasadena 18, Calif.
EXPORT Plastics Machinery: OMNI EXPORT CORPORATION
460 4th Ave., New York 16, N. Y.

Creative Engineering



How about this for a starter?

You are looking at the business end of a synchronous motor starter. The two parts magnified—a shaft insulator and high-voltage panel—are made of Synthane laminated plastics—for good reasons.

Important requirements of the insulator and panel are excellent electrical insulating ability and ease of machining to close tolerances. The shaft has to be dimensionally stable, remain straight and true. The Clark Controller Company found in Synthane the proper combination of properties for these two parts of their 4160 Volt—3 Phase Synchronous Motor Starter.

You may need an entirely different combination for your application. In Synthane you have strength, lightweight, resistance to moisture and abrasion, hardness, denseness, toughness. Synthane is also unaffected by oils, greases, many corrosive atmospheres, gases and solutions. It is available in many grades for easy selection of specific qualities and in various forms such as sheets, rods, tubes or ready-fabricated parts, or may be economically molded from laminated or macerated materials.

In short, Synthane has the right *combination* of properties and forms for electrical, mechanical and chemical jobs in every industry.

Write for the new complete catalog of Synthane Laminated Plastics, containing grades, properties and uses. Synthane Corporation, 8 River Road, Oaks, Pennsylvania.

PLASTICS WHERE PLASTICS BELONG

SYNTHANE

Manufacturers of laminated plastics

IN NYLON ...to meet Defense Requirements

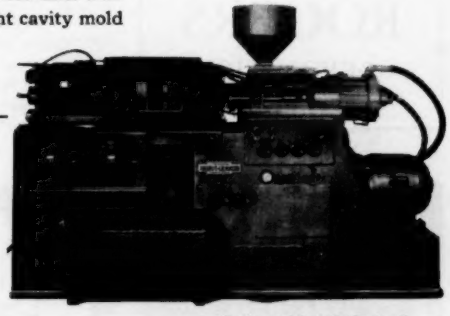
Nylon output transformer coil forms for communication head sets. Molder, Thorgren Tool and Die Co., Valparaiso, Indiana.

if you're contracting the supply of defense-essential molded parts, a Fellows Injection Molding Machine will save you time, money and material. The use of small molds cuts tooling time and cost. Material is saved because of the small sprues and runners.

if you're going to mold in Nylon, a perfected narrow-limit temperature control for "non-drooling" cylinder performance gives Fellows machines a decided advantage.

if you're aiming for speed and economy in molding precision parts, consider the production time for these tiny 0.025 inch wall Nylon coil forms—2400 per hour from an eight cavity mold on a Fellows 'Speed-Flo' 1B-3-15.

if you want profit-making 'Speed-Flo' performance—on Nylon, styrene or acetates—get in touch with our nearest office. You'll be glad we suggested it.

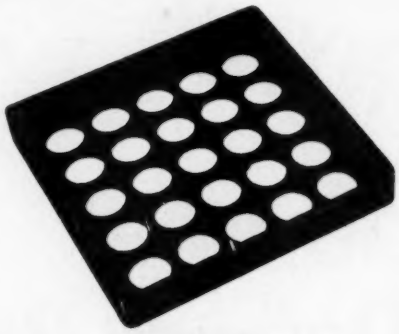


Fellows Model 1B-3-15—the 3-ounce machine for precision or "hot molding."

Fellows
LEOMINSTER
injection molding equipment

THE FELLOWS GEAR SHAPER CO., Plastics Machine Div., Head Office & Export Dept., Springfield, Vt. Branch Offices: 616 Fisher Bldg., Detroit 2, 5835 West North Avenue, Chicago 39 • 2206 Empire State Bldg., New York 1 • New England Distributor: Leominster Tool Co., Leominster, Mass.

RUGGED TOTE TRAY *Cradles* PRECISION PARTS THROUGH PRODUCTION



MOLDED OF ROGERS CORPORATION PHENOLIC

FOR SARGENT & CO.
BY TEAL MOLDING CO., INC.

Better Parts for Better Products

ROGERS
CORPORATION
Established in 1832

This tote tray, molded of Rogers RX 429, an impact phenolic molding compound, gets slammed around . . . immersed in hot water . . . exposed to steam blasts. Frequently, it's on the bottom of a stack of similar trays totalling 1122 pounds of parts.

Sargent uses these trays to carry precision brass parts with external threads which must be protected. RX 429 was specified because it could take the harsh treatment and yet not nick the threads. Teal Molding Company, Inc. approved this choice of material because it can be automatically preformed, has a fast rate of cure, and is clean and dustless.

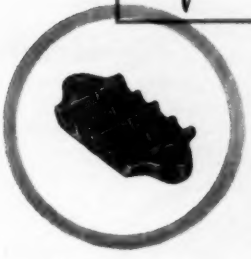
Perhaps you have a problem requiring a high strength material. Our phenolics have demonstrated repeatedly that high strength parts can be obtained at low unit cost. For more details on our materials, please write to Dept. P, Rogers Corporation, Manchester, Conn.

Trays nest compactly and securely, simplifying handling during secondary machining operations. Trays stand up to repeated stacking and unstacking without chipping, cracking or breaking.

Start of hot-water detergent bath. Toughness of Rogers RX 429 is attested by the fact that trays go unscathed through repeated washing operation.

Note how compactness and strength of trays reduces storage space required for parts. Bottom trays each support 1122 pounds.

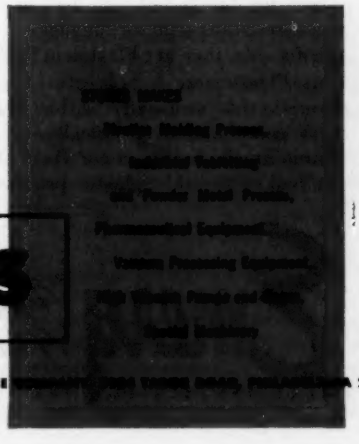
Automatic molding reduces cost for R-B-M



Plastic parts for an electrical assembly are produced by the R-B-M Division, Essex Wire Corporation, Logansport, Indiana, by automatic molding. These are the parts that started R-B-M on the molding of plastics. R-B-M chose automatic molding because of its distinctive advantages . . . uniformity of parts . . . low mold cost . . . low labor cost . . . material savings . . . controlled inventory . . . minimum investment.

Stokes Model 741 fully automatic molding presses were selected for the job because of their reliable, foolproof and flexible operation . . . and the speed with which they can be set up for production. Stokes fully automatic molding presses greatly simplify molding practices . . . one man can tend a battery of presses.

If you want to learn if your parts can be produced more economically by automatic molding . . . send parts or blueprints for a full analysis. There is no obligation, of course.



STOKES

F. J. STOKES MACHINE [illegible] 20, PA.

where durability counts...

Be Sure to Specify Emery Plastolein 9720 Resinous Plasticizer

Whatever you make . . . be it plastic overshoes for dainty feminine feet or a tough, scuff-resistant trim for luggage—if it must be durable, then get Plastolein 9720 Resinous Plasticizer. A polyester type compound, this unusually stable plasticizer was compounded specifically to provide *durability* in heavy-gauge vinyl sheeting. It makes possible plastic products with remarkable resistance to water extraction. In addition, Plastolein 9720 is characterized by extremely low volatility, superior heat and light stability and excellent resistance to oil extraction. Also Emery Resinous Plasticizers are easier to handle, more readily pumped and shipped in bulk—because of their lower-than-usual viscosity.

Be certain your plastics remain plastic! **Specify** { EMERY PLASTOLEIN PLASTICIZERS *every time!*

Emery *Plastolein Plasticizers*

EMERY INDUSTRIES, INC.
Carew Tower Cincinnati 2, Ohio

Branch Offices:
3002 Woolworth Building, New York 7, N. Y.
187 Perry St., Lowell, Mass.
221 N. LaSalle St., Chicago 1, Ill.
401 N. Broad St., Philadelphia 8, Pa.
420 Market St., San Francisco 11, California
Export: 5035 R. C. A. Building, New York 20, New York

A SPECIAL SERVICE TO MODERN PLASTICS READERS, REPORTING AND INTERPRETING THE LATEST NEWS AND DEVELOPMENTS FROM WASHINGTON AND ELSEWHERE AS THEY AFFECT THE PLASTICS INDUSTRY AND THE MOBILIZATION PROGRAM

Modern Plastics BULLETIN

November 19, 1951

The Quick Look

The sales outlook in plastics for the immediate future is somewhat remindful of the player in stud poker who is drawing his last card in an attempt to fill an inside straight against a hand which shows three exposed kings. "He's hopeful, but he isn't too sure." With their usual optimism, which is part of their trade, most plastics raw materials sales managers insist business has already picked up and will increase from its temporary slump with possibly a seasonal decline of no more than usual size in December. Molders and other processors, when questioned on the state of their operations, will frequently give the interviewer a sly wink and say: "My business is fine —but, oh, boy, some of my competitors are sure in a bad fix!" All of which adds up to one terse statement: business is spotty. But by and large, the sales situation clear across the board, insofar as plastics are concerned, looks more optimistic at the time of writing than it did a month ago.

Increased Retail Sales Help Plastics

Polystyrene and vinyl film or sheet vendors are particularly interested in the recent pick-up in retail sales, especially since it is evident that the long dormant household goods and furnishings have taken on new life. New York City retailers were agreeably startled by a report on election day that sales had increased 15% over a year ago; there have been continuous reports of other percentage increases from all over the country. Further indications that the retail increase is really substantial are found in the following figures: all business inventories went down by $250 million in September—manufacturers increased their inventories by $350 million but retail stocks declined by $600 million, of which $250 million was non-durable goods. Retailers are taking their time about building up another big inventory, so September and October inventory depletions may not be immediately replaced, but at least that big inventory which was a bugaboo to further purchasing from the producer is being liquidated.

Polystyrene Sales at High Level

A lot of the talk about poor business is hardly justified when measured by any performance except the immediate past. Take polystyrene as an example. August production of 26,500,000 lb. was the largest on record, and sales of 24,100,000 lb. were close to the 25,400,000 lb. record set in October 1950. With the exception of January and February (when sales were from 17 to 18 million lb.), every month of 1951 up to August showed sales of 20 million lb. or more. The complaint is that sales are not as high as the unprecedented levels of from 22 to 25.5 million lb. per month in the last six months of 1950. Yet if current reports are to be believed, resin sales in the last four months of 1951 will average at least 22 million lb. a month and most of it will be molded. If molders sell 22 million lb. of processed polystyrene per month in the last four months of this year, the last half of the year will be the second or third best such period which molders have ever had, from a volume viewpoint. It may be that some molders are doing a lot more business than others; also, some have increased their capacity to such a point that 100% capacity operation last year is only 50% capacity this year. But the over-all sales picture is hardly to be classified as "poor." As one molder said at the recent WPB Chemical Division Alumni Meeting in Washington: "It ain't bad, Bud—it ain't bad!"

Vinyl Chloride Slumps but Still at High Volume

The vinyl chloride situation is somewhat similar with the comparative percentage of decline in the last six months somewhat sharper. The last six months of 1950 and the first six of 1951 were whopper periods —the best ever recorded. Sales for vinyl film and

sheet started to decline in the late spring of 1951. Phonograph records also felt a market decline. Extruded welting for the automotive industry began to decline in mid-year when auto production was forced down because of metal shortages. But wire coating and other extrusion operations started a steady rise in July or August 1950 and continued to climb until mid-summer 1951, thus helping to keep total vinyl production figures a bit higher than in other years.

In July, a month when vinyl sales are nearly always at their lowest point of the year, the usual decline from the preceding months was evident in 1951, but the outstanding fact is that July was probably a higher month for vinyl chloride resin sales than any of the following months of the year. Despite this last half-year decline, vinyl resin sales for the entire year 1951 will be above 1950 in every category including film, sheeting, wire coating, etc. Buyers of resin bought heavily in the early part of the year because they wanted to maintain their historical purchasing position and to put resin in inventory in anticipation of a fall increase in civilian and military buying—an increase which has been slow in developing.

Sales of finished goods aren't disastrous either—they just happen to be lower than in the peak periods of late 1950 and early 1951. In addition, nearly all processors have increased their capacity by adding new equipment or running their old equipment more efficiently. As a result, they develop a gloomy look when they don't have enough business to warrant running calenders, spreaders, or extruders around the clock seven days a week. Resin producers today are exhibiting their confidence in the near future by running on a large scale. Thus they will fill their pipelines which have been depleted ever since early 1950 and have plenty of resin in inventory for a market pick-up which they expect in February or March, if not sooner.

Phenolics in Good Position to Move Ahead

The phenolic molding powder situation follows about the same pattern. From August 1950 through June 1951 the industry was selling from 17 to 21 million lb. a month and could have sold more if it had been available. This was the greatest eleven-month sales period in the industry's history. July and August 1951 dropped to a little under 16 million pounds. It is estimated that the last four months will run close to 17 million lb. a month. Some producers may be better off than others in corraling their share of the business, but the molders who are using all that resin must be doing fairly well; any time the industry uses 16 or 17 million lb. a month, business is pretty good. It was not so long ago when the compression industry was using only 6 to 12 million lb. of phenolics a month. Some analysts are still surprised to see that the industry has survived the severe cutbacks in autos, refrigerators, television sets, and other durable goods with so little loss of volume, especially in view of the slowness with which military orders have developed.

Inflated orders with which customers inundated their resin suppliers early in the year have been wiped off the books and a customer can generally get what phenolic he needs for military use without even a DO order.

Polyethylene

Polyethylene allocations for November were notable in that only 33% was military DO. That's 10% less than in September. The cause is more production and a temporary decline in military demand. The amount allowed for essential civilian uses was 43%—up slightly from October. "Free" distribution was 24%, about the same as the month before.

But the clamor for more polyethylene goes on—from packaging people in particular. They want it for an ever-widening field including fresh produce, meat, carrots, and the like. A new request comes in for marshmallows—when wrapped in polyethylene they keep fresh much longer than in other wrappers. The unbreakable bottle business, too, has been hard hit by allocation since almost none has been allowed under government order.

The wire coaters, like the packaging people, claim they don't get nearly enough polyethylene even though they are allocated large quantities for essentialities such as certain types of line wire; service drop cable; street light wiring; wire for police and fire systems; railroad control cables; and long distance toll cable. Each wire coater is allocated polyethylene for these purposes according to his historic purchasing record. Yet allocation does not provide nearly enough for applications other than essential items, so the wire coaters get more from the "free" pool. But even with the amount of material which they can get from this latter source, the wire coaters still do not have sufficient polyethylene to meet their wants for such things as television lead-in wires, neon sign wiring, etc.

Polyvinyl Alcohol

The situation in polyvinyl alcohol has cleared up considerably since the extreme tightness last spring, when distribution was controlled almost entirely by government directive. The answer is in more production, which will continue to increase in small amounts, as well as the use of substitutes. A soy bean product has also been announced as a satisfactory extender for polyvinyl alcohol.

Early in the year, the government limited the amount of polyvinyl alcohol that could be channeled into military uses to 25,000 lb. a month. This was done

to prevent disruption in the production of certain types of paper milk bottles, bandages, and a few other applications that had come to depend on PVA. The situation became so critical at one time that the limitation was lowered to 10,000 lb., but it's now back to 25,000 and the producer has made it more freely available to his customers by eliminating his company-established allocation.

The chief military use, of course, has been in waterproofed V-boxes. Chief civilian applications are primarily as an adhesive for milk containers, paper cups, drinking straws, multiwall bags, carton sealing, case lining, furniture joints, bookbinding, spiral and convolute wound tubes, folding boxes, foil laminating, and specialty papers. It is also used in textile sizing (especially for nylon hose); as a bonding agent for unwoven fabric; for molding gears; in extruded coatings for wire used in motors; in film and sponges; and as an emulsifying agent for pharmaceuticals.

PVA is a versatile material with many uses under development and more to come. In England its uses have been even more widely heralded than in the U.S. In 1949, U.S. production was around 4 million lb. but more than that is now available. 'Tis a material well worth watching.

Phenolic Resin for Softwood Plywood

Recent reports that the softwood plywood industry was on the decline from a volume standpoint are vigorously denied by authorities who are in close touch with industry statistics. Certainly the amount of phenolic resin being consumed by the exterior plywood division of the industry belies any indication of a drop in production. Supposedly the premature and adverse report on the industry's progress developed from gloomy representatives of recently established new plants that have added 25% additional production capacity to the softwood plywood industry this past year. Delay in placing military requirements plus a decline in housing construction has caused the market for interior type softwood plywood to soften up a bit and the newcomers in the industry have suffered most from these factors; the old-timers seem to be rolling merrily along.

Types of Plywood

For those not too familiar with plywood terminology the following facts will be helpful:

Softwood plywood is produced almost entirely from fir trees. It is divided into exterior and interior grades depending upon its ultimate end use. The exterior grade uses phenolic resin as the adhesive or bonding medium almost exclusively and accounts for somewhere near 30% of total softwood plywood production. The time is coming when part of the interior type will also use phenolic, not only for performance but also so that it may be used either indoors or outdoors as desired. The adhesive is about 50% solids. Seventy lb. of adhesive, including water, filler, and caustic soda, will cover about 1000 sq. ft. of plywood on a 3-ply basis.

Interior grade softwood plywood currently uses little phenolic resin. It is most generally bonded with soy bean or blood derived adhesives.

Hardwood plywood comes from deciduous or broad-leafed trees. Whether it be walnut, willow, cottonwood, or any other type but coniferous, it is still called hardwood. Today, it is used primarily for furniture and interior work. Great quantities of urea glue are used for this material, but probably not more than 2 million lb. of phenolic glue will be used for hardwood plywood in 1951. The hardwood branch of the industry has declined severely in the last six months due largely to a drop-off in furniture manufacturing.

The 1941-1945 average production of softwood plywood was 1,494,000,000 square feet. In 1950, production was 2,500,000,000 square feet. In 1951 it will be near 3,000,000,000; current operating rate is about 3,200,000,000 square feet. About one-third of this production is processed with phenolic adhesives.

To those who are curious about the ever-increasing uses of phenolic resin, plywood offers at least a partial explanation. It's been less publicized than resins for waste wood and sand cores, but these latter two have not yet attained large volume production; on the other hand, phenolic adhesive for plywood is already big and getting bigger. The limit has by no means been reached. Furthermore, indications are that it will have a better record for maintaining volume in the last six months of 1951 than any other segment of the phenolic resin industry.

Here are some interesting figures to maintain that belief:

Phenolic resin adhesive sales in 1950	28,500,000 lb.
Sales in first 8 months of 1951	26,800,000 lb.
Estimated sales last 4 months of 1951	14,700,000 lb.
Total estimated sales for 1951	41,500,000 lb.
Total estimated production	45,000,000 lb.

In this industry the production figure is just about as good a total use figure as sales volume since so many companies make and use their own resin. The big percentage increase is particularly significant in this year of 1951 because most other categories of phenolic resin will show a decline in sales volume during the last six months in comparison to the first six months so that they will be hard pressed to show as large a sales volume in 1951 as they had in 1950. And for those

who are interested in the amount of phenol consumed, it is pertinent to point out that phenolic adhesives consume about 0.9 lb. of phenol per lb. of finished resin while molding compound consumes only 0.41 lb. of phenol per lb. of finished compound. Formaldehyde is consumed in these resins at about the same rate as phenol.

There is as yet no evidence to indicate a decline in the demand for softwood plywood. There will be dips, of course, but the long term prospect looks as if more and more of it will be used, with special emphasis on the exterior phenolic type. Today there is a government order directing each Douglas fir plywood manufacturer that produces both exterior and interior plywood to produce at least 50% of its reserve production in exterior type. From November on, its "reserve" production is required to be at least 30% of its average monthly production of softwood plywood during its base period (the fourth calendar quarter of 1950 and the first calendar quarter of 1951). The reserve is to be used to supply military orders. It is estimated that 40% of phenolic type plywood is now going into military uses.

Uses for Plywood on Upward Spiral

Among the naval and military uses for plywood are mine sweepers that range in length from 60 to 158 ft. (large quantities of resorcinol are also used for this purpose in laminated wood); landing craft; pallets on which tanks are loaded in preparation for delivery by parachute into combat areas; shelters for military housing in extreme Arctic or tropical climates; and, of course, all sorts of construction jobs where it is used both structurally and for concrete forms. In relation to shelters, it has been pointed out that when treated with pentachloraphenol, phenolic bonded plywood will withstand weathering in the tropics as well or better than most any other material. It is also significant that redwood plywood is especially adaptable for structural work in the tropics. Every foot of redwood plywood is processed with phenolic. Redwood costs about 10% more than fir but longevity is improved. Redwood plywood structures have now given satisfactory use in Hawaii for at least four years. From this demonstration, it is logical to assume that such structures would be practical for the Armed Forces, rubber companies, oil companies, steel companies, and all other industries which maintain housing projects in tropical regions.

Broadening the Production Base

A significant trend in the plywood picture is that M-63, the NPA's plywood order, specifies that each Douglas fir plywood manufacturer that produces interior type only is required to produce at least 40% of its reserve production in grades suitable for concrete form use. This indicates an increasing volume use for that purpose, but the interesting angle for phenolic resin producers in this development is that an ever-increasing amount of concrete form plywood is being bonded with phenolic resins instead of so-called interior glues in order to lengthen its life and improve its re-use possibilities.

Millions of Pounds of Adhesives

In housing, softwood plywood of both interior and exterior types has nowhere near reached its peak, according to plywood use analysts. Somewhere near half a billion sq. ft., based on a $\frac{3}{8}$-in. thickness, will have been used for this purpose in 1951. A plywood pre-fab uses about an average of 4000 sq. ft.; a small rambler or ranch-type house uses 400 sq. ft.; apartments consume anywhere from 150 to 300 sq. ft. per unit, if the plywood used for concrete forms is counted. About 60,000 pre-fabs will be built in 1951; about 58,000 in 1952. A large quantity of resorcinol is used for these jobs, but other resins are also used in big volume. Each of these structures will use at least some plywood. Increasing use of plywood for exteriors in all types of structures has also been promoted by the development of such plastic surfacing as phenolic impregnated paper like Kimpreg and specially prepared synthetic coatings like the alkyd type resin sealers such as White Rez.

Boats, of course, are another big civilian use for both soft- and hardwood plywood with phenolic and resorcinol resins generally employed. Laminated wood is also likely to be a coming development in this field.

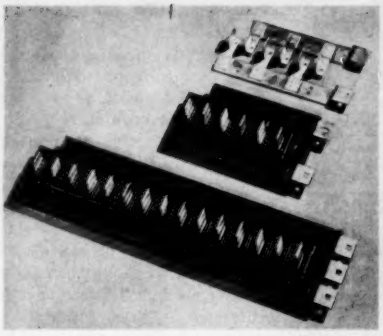
This covers only a part of the softwood plywood applications; we can't possibly discuss all of them in this space. At a later date the discussion will be continued as it pertains particularly to laminated wood, resorcinol, and other frontiers now emerging in the plywood and wood veneer industry—and the consequent need for synthetic resins.

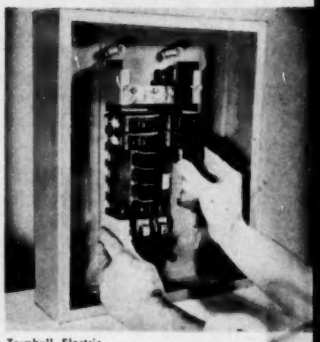
Bullets, Butter, and Nylon Plastics

One of the developments that has currently caught the plastics industry by surprise is the availability of nylon plastics. Shortly after Korea, nylon plastic became exceptionally tight largely because a sizable percentage of total production was being used as jacketing for infantry assault wire. There is still a large quantity of nylon being used for that purpose, but Du Pont has increased production to such an extent that it can now take care of all military needs and have a goodly amount left over for civilian applications. In view of this situation, and because NPA has adopted a basic policy of minimum control whenever possible, it is quite probable that the nylon allocation order may be revoked in the near future.

Courtesy Ideal Plastics Corp.

Skin-like head and limbs of Bonnie Braids doll are slush molded plastisol





Photos courtesy Trumbull Electric

Shock-resistant, insulated bus bar assembly for circuit breaker boxes and panel control boards is made by casting metal bars in a solid ¾-in. thick piece of vinyl plastisol

It's Done With *Plastisols*

From bobby pins to bus bars, from playthings to plating racks, these versatile vinyls are just beginning to be appreciated

PROBABLY no materials in the plastics industry are as versatile, as promising—and as yet unappreciated—as vinyl plastisols.[1] Most people in the industry who have not already become acquainted with the varied virtues of plastisols think of them as "that goo used for slush molding." But plastisols are much more important than that slighting remark would indicate and their applications reach into many fields.

Vinyl plastisols can be slush molded into hollow objects—and can be molded into hollow shapes by a similar but less well known process called rotational molding. They can also be injection molded; molded in closed molds with little or no pressure; cast to shape in open molds; extruded; dip molded; dip coated; spread coated on paper or fabric; cast into film or sheet; used in inks; spray coated; or expanded into foam.

Some of these methods of processing plastisols have already found numerous applications; others are just being perfected and have yet to find large scale commercial applications. Dip coatings, for example, are used on items as varied as bobby pin tips and industrial plating tanks 10 ft. long. Sprayed plastisols and foamed plastisols, on the other hand, have as great and as varied potentialities as dip coatings—but their uses remain to be developed.

Regardless of the method of processing used, there are two basic steps necessary to transform a liquid plastisol into a finished product. First the liquid or paste must be made to assume the desired shape or form. Then it must be heated so that the resin, plasticizer, and modifiers fuse into a homogeneous piece.

The length of time required for fusion at a specific temperature depends upon the size and shape of the finished product and upon the formulation of the particular plastisol being used. Usually the cure temperature ranges from 305 to 375° F. However, at least one manufacturer of plastisols, Elastomer Chemical Corp., Nutley, N.J., has developed a special low temperature curing material which fuses at 185 to 225° F. This material was developed for making flexible molds from plaster master models because the masters on which the molds are cast would not stand up under the higher cure temperatures. In other applications, such as fabric coating, this low temperature material can be used to speed up production by cutting down fusing time.

There are so many methods of processing plastisols, and so many

[1] Plastisols (often called "paste resins") are dispersions or intimate mixtures of vinyl resins in liquid plasticizers with appropriate stabilizers, pigments, and other modifiers added. They are 100% total solids materials, and should not be confused with organosols, which contain volatile solvents.

variations of each method, that there is virtually no such thing as a standard plastisol material. Each individual slush molder, for example, has his own method of slush molding. Consequently, he has his own ideas as to what the viscosity of a plastisol should be, at what temperature the ovens should be operated, how rigid the finished piece should be, etc. As a result, plastisols are usually tailor-made for each application and for each customer.

Variations in the properties of plastisols can be obtained by combining as many as six or eight different plasticizers, several stabilizers, and one or more pigments or fillers, in a single compound.[2] There are so many variables that the possibilities are infinite, and it takes an expert to design a plastisol compound so that the material and the finished product will have the combination of properties desired.

One of the most important variables in plastisols is the plasticizer-resin ratio. The plasticizer content can be as little as 55 parts to each 100 parts of resin and can be as much as 120 or even 150 parts plasticizer to 100 parts resin.

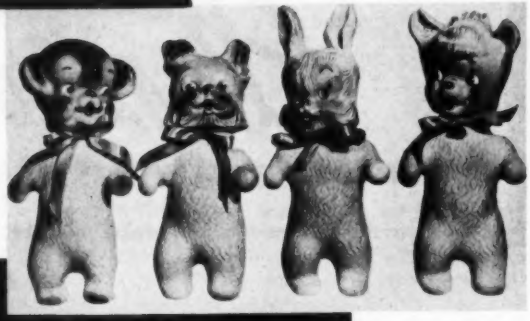
The rigidity of a finished plastisol piece depends in large measure upon the resin content. Normally, plastisols range in hardness from 50 to 90 durometer. However, Stanley Chemical Co., East Berlin, Conn., is now making one plastisol formulation with a durometer hardness of 25 and United Chromium, Inc., New York, N.Y., has one plastisol material with a durometer hardness of 100.

Among the other plastisol properties which can be built in by proper compounding are abrasion resistance; oil, grease, and solvent resistance; low temperature flexibility; and plasticizer retention to avoid stiffening and cracking with age.

The properties desired depend, of course, upon the application. What those applications are today can best be considered by taking a look at the various processing methods.

[2] See "Vinyl Plastisol Compounding," by W. D. Todd, MODERN PLASTICS *27*, 111 (Nov. 1949).

Courtesy Molded Latex Products, Inc.



Toys with rubber latex bodies have swivel-mounted animal heads slush molded of vinyl plastisol which are decorated in bright colors

Courtesy Bakelite Co.

Slush molded vinyl is used for the heads and limbs of many dolls because of its feel, color, and moldability

Slush Molding

Slush molding, which could more accurately be called slush casting, is a method of producing hollow objects. The process consists of competely filling a mold with plastisol, holding the filled mold under heat long enough for the desired thickness of material to set on the inside wall of the mold, pouring out the excess material, continuing to heat the mold to fuse the material remaining in it, cooling the mold, and removing the piece from the mold.[3]

There are almost as many variations of this process as there are processors. The types of molds used, the method of filling the molds, the method of applying heat, and the method of moving the molds from one stage to the other will depend upon the tastes and prejudices of the molder, the length of the run, and the equipment available.

Some of the large doll manufacturers, for example, have almost completely automatic set-ups in which the only thing done by hand is the removal of the finished piece from the mold. Smaller operators do almost the whole process by hand. There is no standard equipment

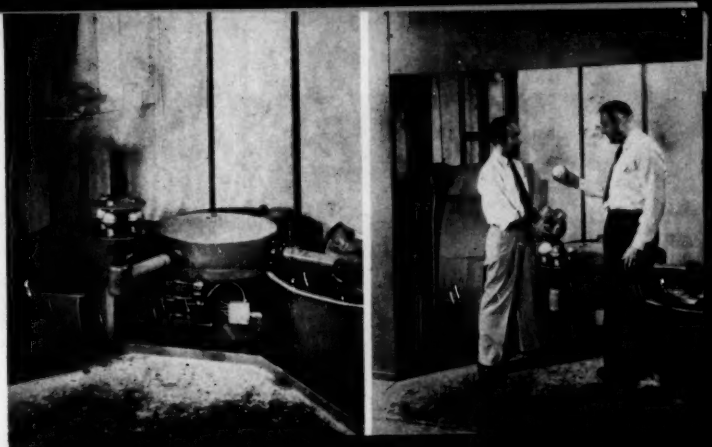
[3] See "Slush Molding Vinyl Plastisols," by Eugene B. Greenspun, MODERN PLASTICS *28*, 101 (Oct. 1950).

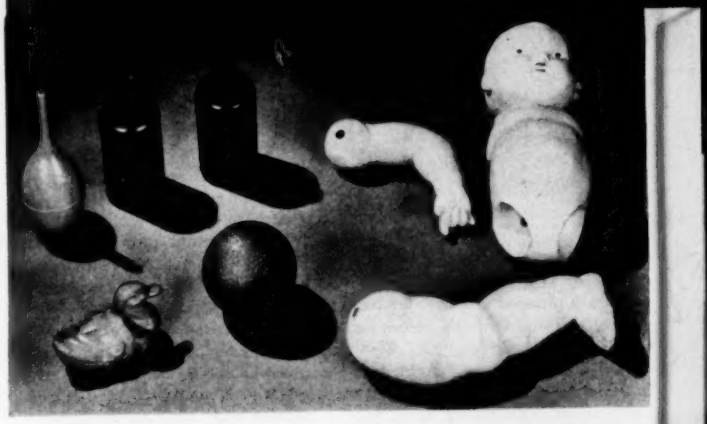
available for slush molding — and the automatic equipment which does exist is considered top secret by those who have it.

Doll heads, arms, and legs were the first major application of slush molded vinyl plastisols—and are still far and away the number one application. Plastisols have virtually pushed rubber latex out of the picture in this application because they have a better, more life-like feel; can more easily be molded to intricate shapes; have better color; and do not pick up dirt as readily as does the more porous surface of rubber. In this application, plastisols are just about competitive with rubber in price but, according to one large doll manufacturer: "Plastisols are so much better that a price comparison is academic."

Ideal Toy Corp., Hollis, N.Y., one of the pioneers in the slush molding field, has used vinyl plastisol parts on its Snoozie, Blessed Event, Bonnie Braids, and Three-Faced dolls. It is also using slush molded vinyl faces or noses on some plush toys.

From dolls and doll parts, it is an easy step to puppets, marionettes, and similar small toys which must be hollow, flexible, and have molded-in detail. Such toys are being slush molded of vinyl plastisol by a number of companies including Geneve Mfg. Corp., Trenton, N.J.; Molded Latex Products, Inc., Paterson, N.J.; National Mask & Puppet Corp., Brooklyn, N.Y.; Lastic-Plastic, Burbank, Calif.; Arrow Rubber & Plastic Corp., Paterson, N.J.; Model Plastics, White Plains, N.Y.; and Jay V. Zimmerman Co., St. Louis, Mo.





Rotational Molding

The process known as rotational molding is considered by many people to be a variation of slush molding—they are wrong. Rotational molding differs from slush molding mainly in that only the predetermined amount of plastisol needed for the finished piece is put into the mold. Thus there is no need to empty out excess material at one stage of the process. Consequently, completely closed molds can be used and the finished object does not need to have any hole in it.

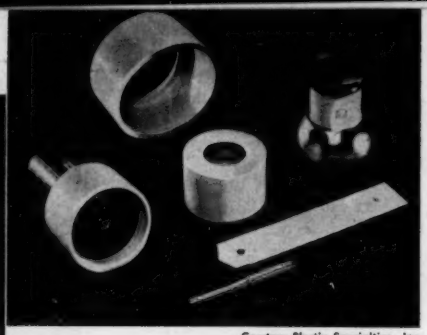
The process gets its name from the fact that the mold is rotated (usually about more than one axis) to distribute the vinyl plastisol evenly on the inside surface of the mold. Some slush molders rotate their molds (usually about only one axis)—but, as in all slush molding, the molds are completely filled with plastisol, some of which has to be poured out before the piece is fused.

Most of the equipment used for rotational molding, like that used for slush molding, is built by the molders themselves and details of design are considered secret. However, there is one rotational molding machine which has been developed as a standard piece of equipment available to molders on a leasing arrangement from Vinl-Cast, Inc., Akron, Ohio. Machine and method are covered by pending patents.

The Vinl-Cast machine has four stations, and the molds are transported from one station to another on four horizontal arms which extend from a central pillar. At the first station, in front of the machine, the plastisol material is put into the molds. The operator then starts the machine and the molds are rotated about the axis of the arm, rotated about an axis at right angles to the axis of the arm, and simultaneously transported one quarter turn clockwise around the central pillar.

At the second station, a two-part oven closes around the still-rotating mold and steam is introduced into the oven. After the steam cycle (during which a group of molds on another arm of the machine is being loaded), the molds are transported to the third station.

There the molds are submerged in a bath of paraffin or glycerine at 350° F. for three to six minutes, de-



Courtesy Plastic Specialties, Inc.

Plating masks are produced by injecting vinyl plastisol into closed mold. Collar type mask snaps on

Courtesy F. D. Pace Co.

Metal pipe is lined with vinyl plastisol for chemical resistance. Vinyl on flanges insures tight seal

pending upon the size and shape of the piece. At the fourth station, the molds are plunged into a water bath to cool them so that the pieces can be easily removed.

Vinl-Cast machines can be built in various sizes. The ones now being built occupy only 100 sq. ft. of floor space and can accommodate molds, or groups of molds, up to 24 in. in diameter and 18 in. high. Among the items which have been produced on the machine are atomizer bulbs, doll parts, play balls, and small crib toys. Some 4-oz. Boston round vinyl plastisol squeezable bottles have also been produced on an experimental basis.

Injection Molding

It is physically possible to mold vinyl plastisols in conventional injection molding machines—but whether it is practical and/or economical is still a moot question. The liquid plastisol can be dumped into the hopper of an injection machine and molded—if the dies are built to close tolerances so that the liquid does not squirt out the parting line when injected into the cavity. But this type of operation presents problems and has seldom, if ever, been used on a production basis.

A more practical method is to extrude the vinyl plastisol, pelletize it, and then use the pellets as an injection molding material. There is some question, however, as to whether many things can be accomplished by this method which could not be accomplished more directly by using a regular elastomeric vinyl molding material.

About the only application of injection molded vinyl plastisol known to be in production is a military application, the details of which are classified. The reason for using a plastisol in that case is the need for unusual low temperature resistance, and oil and grease resistance —all of which could be obtained more easily in a plastisol compound than in an ordinary molding compound. The plastisol for this application is extruded and pelletized before molding.

Vinyl plastisols can also be "injection molded" without the use of conventional injection machines or other expensive equipment. Because of their viscosity, and because they can be fused with heat and without pressure, vinyl plastisols can be injected into closed molds with an ordinary grease gun. The molds can be held closed in small compression presses—or even with clamps or bolts.

Undoubtedly the most interesting application of vinyl plastisols molded by this simplified injection method is the Magic Carpet molded by the Magic Door Div., The Stanley Works, New Britain, Conn., using plastisols made by The Stanley Chemical Co., East Berlin, Conn. The Magic Carpet, which is made in various sizes ranging from 29 by 36 in. to 29 by 93 in., controls the operation of a door in a manner similar to that of the photoelectric "eye."

The Magic Carpet consists of a single molded piece of vinyl plastisol $\frac{9}{16}$-in. thick with a $\frac{3}{16}$-in. thick sandwich of three aluminum plates molded-in. The plates are held apart by spacers and are connected to lead wires. As little weight as that of a 23 lb. child anywhere on the carpet is enough to push two of the plates together and make an electrical contract.

Before vinyl plastisol was adopted, the Magic Carpets were made of rubber. These could not be molded in the same manner, and the aluminum plates had to be sealed between sheets of rubber. The advantages of vinyl plastisol, in addition to the fact that it can be molded in one piece, include resistance to

water, ice, and snow; resistance to abrasion and wear; resistance to soaps, acids, and alkalies used in cleaning solutions; resistance to the effects of weather, including exposure to direct sunlight.

Vinyl plastisols are also being injected into a closed mold to produce plating masks made by Plastic Specialties, Inc., Palatine, Ill. The masks conserve current and plating material and avoid cleaning-up operations by preventing deposition of plating on anything but the sections of the metal parts where the plating is required.

There are masking tapes which can be used for this purpose, but they require time-consuming manual application and must be replaced after each plating cycle. Masking waxes are costly and have a tendency to flake off in the plating bath. Rubber masks would require expensive dies and would deteriorate in prolonged contact with plating solutions.

The vinyl plastisol masks are inexpensive to produce, withstand exposure to cleaning solutions and plating acids, resist the 150 to 160° F. heat encountered in the plating bath, are easy to apply and remove, and can be reused repeatedly.

To make the masks, Plastics Specialties takes a sample of the part to be masked, or a thin aluminum duplicate, and invests it in a metal chamber. The space between the part and the inside walls of the chamber becomes the mold for the vinyl mask. The specially compounded plastisol, supplied by Bradley & Vrooman Co., Chicago, Ill., is transferred from a pressure tank into the mold through a nozzle. The mold is then sealed and put in an oven at about 425° F. for 20 min. The mold is then placed in cold water before being opened for removal of the vinyl part.

Where the shape of the part is such that an enclosed mask cannot be slipped into position, the vinyl plastisol mask can be made in the form of a collar with an integral button so that it can be snapped on or off.

Injection of vinyl plastisol into a closed mold is also being used by Robinson Plate Glass Co., Akron, Ohio, to mold vinyl plastisol threaded fittings onto the ends of ceramic pipe.

A similar application which should probably be mentioned under the heading of injected plastisols, although the manufacturer refuses to discuss his method of production, is the plastisol-lined metal pipe being produced by F. D. Pace Co., Grand Rapids, Mich. The Pacite lined pipe made by this company is available in any diameter in lengths up to 10 ft. The vinyl plastisol lining is usually ⅛ in. thick for pipe up to 3 in. diameter and 3/16 in. for larger pipe.

The pipe is flanged and the plastisol lining covers part of the flange so that a tight plastisol-to-plastisol seal is obtained when two sections of the pipe are joined. The pipe lining has a smooth finish and is highly resistant to inorganic acids, alkalies, oxidizing agents, and corrosive inorganic salts. It withstands temperatures as high as 180° F. and as low as minus 20° F.

Casting

Closely allied to the modified injection molding of plastisols is casting in open molds. This method is being used by Burke Flexo-Products Co., Traverse City, Mich., to produce fishing lures from Geon paste resin. The lures, cast to the shape of insect larvae, are made in open face molds. The heat required for fusion of the plastisol is applied with thermostatically controlled hot plates.

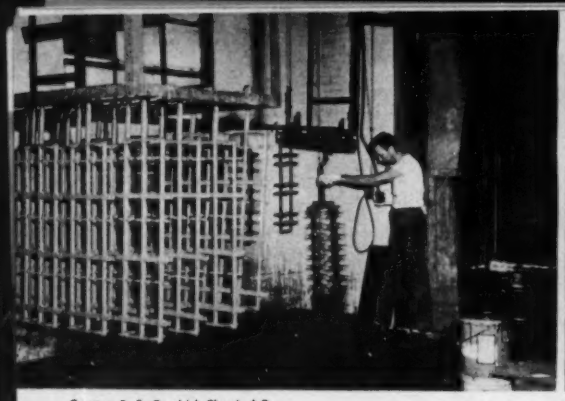
Printing rollers are also being cast of vinyl plastisol. Ames Rubber Co., Hamburg, N.J., is using a plastisol material made by Elastomer Chemical Co. to produce the rollers, most of which are about 9 in. long and 1½ in. in diameter. On an experimental basis, other manufacturers have cast rollers up to 14 in. in diameter and several feet in length.

Metal parts are cast into plastisol in bus bar assemblies for circuit breaker boxes and panel control boards made by Trumbull Electric, Plainville, Conn. Instead of being mounted in the box separately, the two or three metal bus bars for each unit are cast into a single piece of vinyl plastisol ¾-in. thick which insulates them from one another, holds them in the proper position, protects them from damage, and labels the various contact prongs which protrude from the plastisol piece.

The 12-circuit bus bar assembly, shown in an accompanying photo-

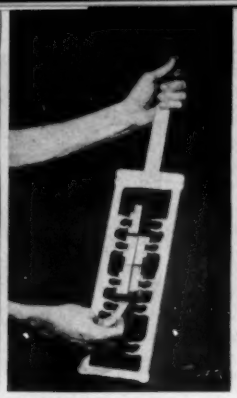
Courtesy Bakelite Co.

Rain boots are made in one piece by dip molding vinyl plastisol material



Courtesy B. F. Goodrich Chemical Co.

Plating racks are given necessary insulation by dip coating them with vinyl plastisol, which is impervious to acids used in plating



Courtesy B. F. Goodrich Chemical Co.

Plastisol coating on plating rack adheres tightly to metal

Courtesy Bakelite Co.

Tool handles can be dip coated for insulation or softer, warmer feel

graph with the two metal parts that are in it, is 7 by 4 in. and contains 12½ oz. of vinyl plastisol. Trumbull also makes a 30-circuit unit which is 16 in. long and has 27 oz. of vinyl, and a 42-circuit unit 22 in. long with 37 oz. of vinyl.

These pieces are made in formed sheet steel hinged molds. The plastisol material, supplied by Stanley Chemical, is poured into the mold and then the metal bars, which are attached to the top half of the mold, are immersed in the plastisol by closing the mold. The top half of the mold contacts the vinyl material only where necessary to mold the barrier fins and identifying letters into the top surface. The 12½-oz. piece is cured for 1 hour at 300° F.

Dip Molding

Certain types of vinyl plastisol items can be produced by dip molding. The procedure is to dip a metal form into a tank of vinyl plastisol, fuse the thin film which adheres to the form, cool the form, and then strip off the plastisol. Thin-walled rain boots are being produced by Coffey-Hoyt Products Co., Gardena, Calif., and unsupported gloves and similar items can also be produced in this manner.

Another end product of dip molding is elbow-like spark plug protectors. Endlaco, Milwaukee, Wis., is dip molding such protectors on specially built automatic equipment capable of turning out 7000 pieces per hour. Ideal Plastics Corp., Hollis, N.Y., is making similar protectors for Kravex Mfg. Corp., Brooklyn, N.Y.

Dip Coating

Many different types of things can be coated with vinyl plastisol by dipping. If a thin film is desired, the article to be coated is immersed at room temperature, allowed to drain, then fused at 350 to 375° F. Heavier coatings can be obtained by preheating the part to be coated. Sometimes immediate gelation of the deposit is necessary to control runs and tears. This can be accomplished by plunging the coated part into hot oil, glycerine, or wax.

Because vinyl plastisol does not adhere to metal, a bonding adhesive must often be used when coating metal parts which are not perforated or do not have an intricate weave so that the plastisol-to-plastisol bond will provide sufficient adhesion.

Michigan Chrome & Chemical Co., Detroit, Mich., which is coating plating equipment and supplying vinyl plastisols to other coaters, has developed a two-coat primer which gives such a strong vinyl-to-metal bond that the coating cannot be

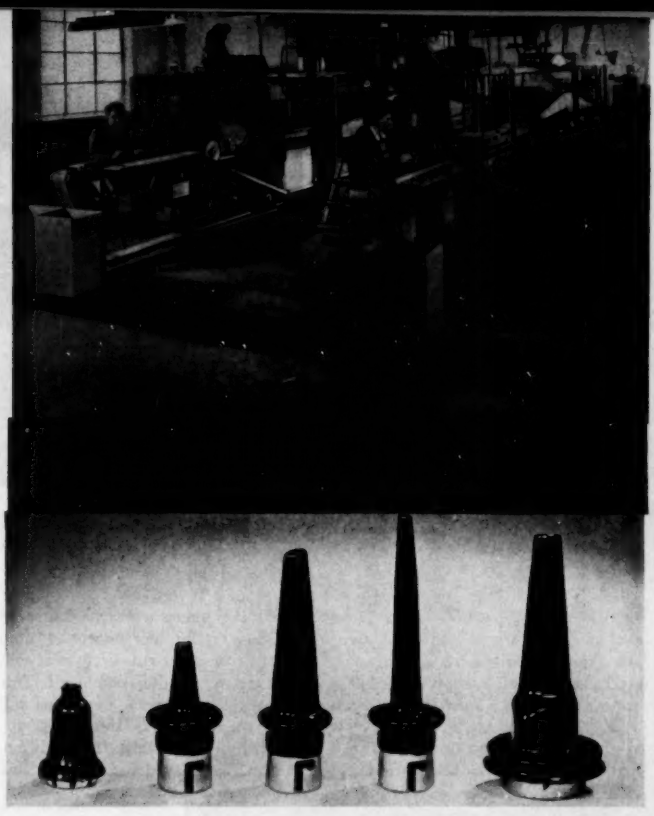
Courtesy B. F. Goodrich Chemical Co.

Low carbon nuts and bolts encased in plastisol can operate in corrosive chemical baths

pulled off even with pliers. The vinyl plastisol itself will break before the bond fails.

The most important applications for dip coatings at present are in racks, tanks, baskets, fume ducts, and other metal plating equipment. Vinyl plastisol is superior to rubber for plating equipment coating because it has better abrasion resistance, is impervious to chromic acid, and can be applied more easily. By controlling compound viscosity, temperature of the article being dipped, and speed of dipping and withdrawal, it is possible to apply coatings with thicknesses ranging from a few mils to ¼ in. per dip.

Among the companies active in protecting plating equipment with vinyl plastisol coatings are Michigan Chrome & Chemical Co.; F. D. Pace Co.; National Plating Rack Co., Paterson, N.J.; and R. W. Renton Co., Cleveland, Ohio.



After plating equipment, the second most important application of dip coatings is probably dish drainers. Vinyl plastisol has replaced rubber in this application because it has better resistance to hot water, soaps, and detergents; has better color; wears better; is easier to coat; and costs less. Among the companies coating dish racks with plastisol are Artistic Wire Products, Inc., East Hampton, Conn.; The Washburn Co., Worcester, Mass.; Wooster Rubber Co., Wooster, Ohio.

Recently, vinyl plastisol-coated racks have been adopted in place of stainless steel racks in the auto-

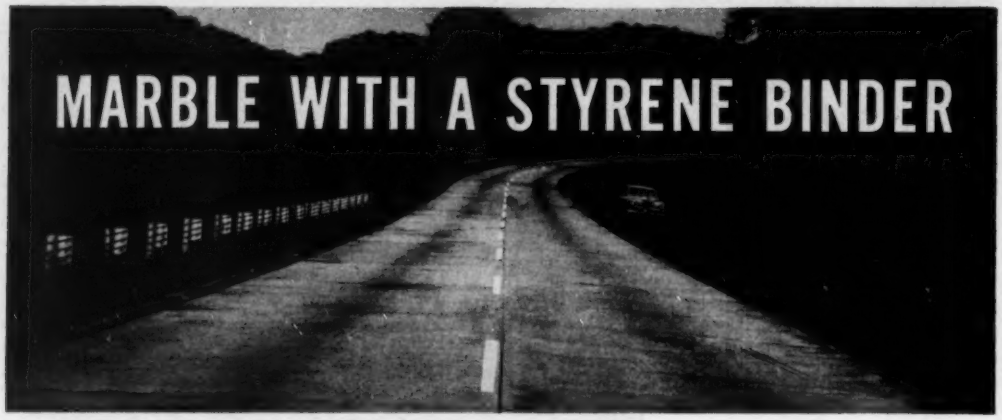
(*Continued on p.* 184)

The appearance and feel of straw and the wearing qualities of vinyl are combined in plastisol coated fabric suitable for table tops, wall covering, etc.

Plastisol coated safety clothing gives chemical worker maximum protection and is light in weight. Coated overalls weigh 27 oz.

Photos courtesy B. F. Goodrich Chemical Co.

MARBLE WITH A STYRENE BINDER



Traffic lines, combining ground marble with a styrene binder, have demonstrated excellent wearing qualities on civilian roads and military installations. The markers will always remain as white as new and can withstand pounding, moisture, and chemical action

PERMANENT traffic lines for roads and airport runways have been made possible by an unusual combination of two materials: ground marble and a styrene binder. This new traffic line, developed by Perma-Line Corp. of U. S., New York, N.Y., is laid into previously-prepared grooves in asphalt, concrete, or other road surfaces.

Lines of this type have demonstrated their wearing qualities in test installations on civilian roads and at military bases. Although its original cost is far greater than that of painted lines, a Perma-Line installation is far less expensive than paint in the long run because it will last as long as the road itself. This reduces maintenance expenses and eliminates periodic traffic disruptions for repainting. In addition, safety is increased because the line is always as white as new.

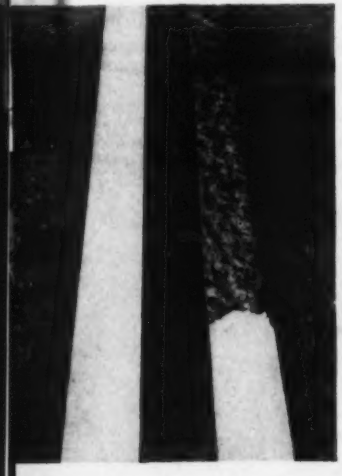
Method of Installation

A Perma-Line from two to six in. wide and ½ in. deep can be installed in a concrete, asphalt, macadam, or brick road, and becomes an integral part of the road. A channel is first ground out of the road surface with special grinding wheels developed for Perma-Line by Norton Co., Worcester, Mass. The Perma-Line material is then put into this groove and cured.

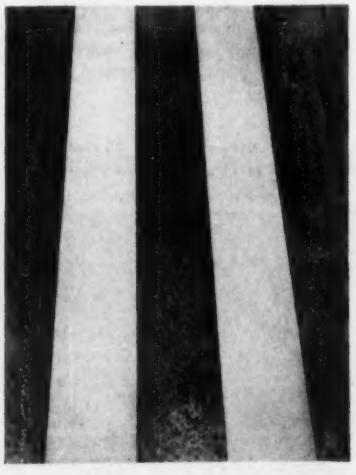
The basic ingredient of the mixture used is ground-up chips of marble. These marble particles are bonded to each other and to the road surface by a styrene-base binder supplied by Koppers Co., Inc., Pittsburgh. Pa. The coefficient of expansion of the Perma-Line mixture can be varied by varying the ratio of marble and binder in the mixture. This ratio is adjusted so that the Perma-Line has the same coefficient of expansion as the road surface. The percentage of styrene-base binder in the mixture varies from 13 to as much as 27 percent.

The Perma-Line mixture is heated, laid into the groove with specially built machinery, and then leveled and cured with a hot roller.

The finished line is impervious to pounding, moisture, or the chemical action of rock salt. Because it is level with the road, it cannot be scooped up or torn out by a snow plow. It wears out at the same rate as the road and has about the same traction as cement. It remains gleaming white because the color is integral in the marble chips and the mixture contains some titanium pigment. The rubbing action of automobile tires polishes the line instead of wearing it off.



Material for traffic line is placed in groove (right) cut into airport runway



Marble and styrene mixture becomes integral part of runway after levelling and curing with hot roller

Big Test Proves Big Bottle

IMPACT resistance of large polyethylene bottles at low temperature was dramatically demonstrated recently by Elmer E. Mills Corp., Chicago, Ill., producer of a new 1-gal. capacity blow-molded polyethylene bottle.

The large bottle was first filled with water and frozen for 60 hours. Then it was dropped from a 30-ft. height onto a concrete sidewalk. Aside from surface scratches, the fall had absolutely no effect on the bottle; the ice was equally unaffected.

The bottle was frozen first in order to subject it to the severest possible stress upon being dropped. Exposure to extremely low temperatures tends to make most materials brittle; this test definitely established the ability of the large-size bottle to take punishment.

After the bottle and its contents had thawed, it was thrown up in the air about 30 ft. three times. Once it landed on its corner, once on the closure, and once flat. Again, the bottle suffered no damage.

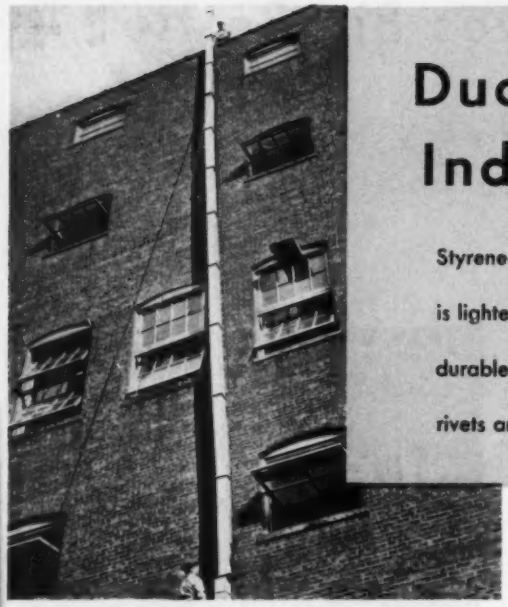
This unusual impact resistance is reported to be due largely to the bottle's engineering design which incorporates an ideal relationship between diameter, height, and strength.

The bottle neck, designed for use with a special molded polyethylene closure, has its own pouring lip and carries a modified AST 29-deg. stub thread, with three full turns for positive sealing. The closure requires no liner and offers three methods of screwing or unscrewing. The 12-sided contour of the closure body fits a standard box wrench; a hexagonal head on the upper section of the cap accommodates either a box or monkey wrench; and grooves on top of the closure permit the use of a rod or screw driver shaft for capping.

The container offers many features of interest to bulk shippers of liquids. Its weight is less than one-third that of a glass container of equal capacity. In addition, it requires no bulky or expensive supplementary packaging protection. If the contents freeze, the bottle will expand rather than burst.

Polyethylene bottle, filled with water and frozen, is dropped from a height of 30 ft. (top) to the concrete sidewalk (bottom); bottle showed no ill effects or damages aside from minor surface scratches

Closure on new polyethylene bottle is designed to be opened or closed with either a standard box or a monkey wrench, or a screw driver



Duct Systems for Industrial Plants

Styrene-rubber copolymer as structural material is lighter, less expensive than stainless steel, more durable than wood or galvanized metal. Even rivets and bolts are made of plastic

Sheets of styrene-rubber copolymer were fabricated to produce this tall exhaust stack for handling products of combustion

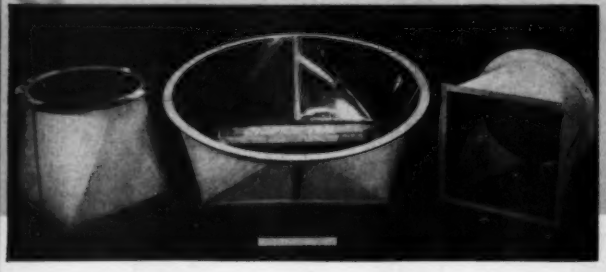
A MAJOR trend in the plastics industry—and one for every fabricator and raw material producer to watch—is found in the growing importance of plastics as structural materials for industrial uses.

Only part of this trend can be attributed to the present shortage of steel, copper, aluminum, and other metals. Plastics can actually be the preferred materials because they offer the industrial consumer one big advantage: They can be specifically engineered to his expanding, more exacting needs.

A prime example of the trend is found in ducting systems and tanks for chemical plants, as now being manufactured on a large scale at Passaic, N.J., by the Mechanical Goods Div., U. S. Rubber Co. Tanks, lines, trays, hoppers, feeders, fume exhaust hoods, collectors, washers, stacks, fume troughs, and gutters have all been fabricated by the company and received with enthusiasm by industry. The accompanying photos show a few of these uses.

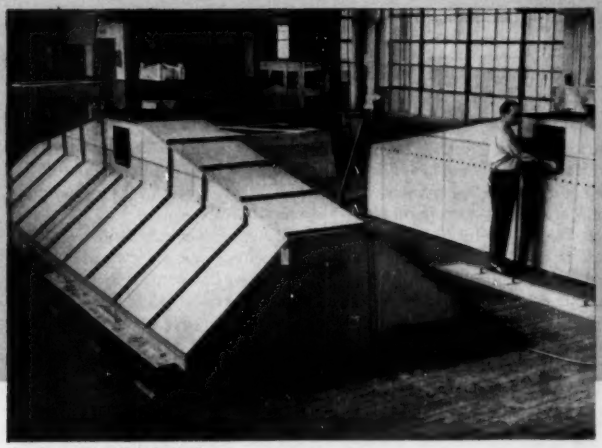
U. S. Rubber is using a blend of high styrene resin and acrylonitrile rubber for its major construction material because this blend combines the three highly desirable properties of dimensional stability, toughness, and chemical resistance.

The equipment is "all plastic." No other material is used in construction. Reinforcing ribs and joint and corner strips are extruded from the



Duct transition sections can be made in virtually any size and shape, with flanges tailored to mate with the adjoining ducts

Acid resistance of material makes it ideal for use in these components of a system for scrubbing hydrochloric acid fumes



All photos courtesy U. S. Rubber Co.

Processing tank hood to handle sulfuric acid mist, built up of sheets of styrene-rubber copolymer. Corner pieces and ribs are extruded from the same material

Fume collectors for electroplating tanks. Airtight assemblies are produced by solvent welding the joints

styrene-nitrile rubber copolymer. Sheets which form the sides, tops, and bottoms of the ducts are of the same material fabricated into panels of either ⅛ or ¼ in. thickness. Rivets used in duct construction are injection molded and are headed-up with a hammer or gun in the same manner as metal rivets; the plastic exhibits sufficient cold flow to make this operation practical. Bolts are machined from extruded rod stock of the same material.

The parts are assembled with the rivets or bolts, and joints are solvent welded, utilizing the same plastic in solution form to make an airtight assembly. No paint or other surface protection is required.

The finished ducts are much cheaper than stainless steel construction and are much more durable than ordinary galvanized metal or wood. Because of their light weight, they are easily installed.

They offer excellent resistance to hydrochloric, hydrofluoric, phosphoric, and sulfuric acids. They also resist such chemicals as sodium hydroxide, ammonium chloride, copper sulfate, ferric chloride, chlorine gas or solution, bleach solution, hydrogen peroxide (3% maximum), oleic acid, and castor oil.

The ducts also have good resistance to the aliphatic hydrocarbons but are not resistant to the aromatic hydrocarbons, ketones, esters, and chlorinated solvents.

Cover for chlorine and chlorine dioxide processing vat under construction. Material can be worked with ordinary hand tools

Copolymer sheet ducts are literally "all-plastic." Even rivets (injection molded) and bolts (machined) are of same material

Reinforced Plastic Now Transparent

New reinforced plastic material combines the light transmission qualities of glass with the strength and the durability of plastics

A PRIME ambition of the reinforced plastics industry has been to produce a fibrous glass-resin transparent sheet.

Obviously, big markets would accrue to a thermoset material with the strength of reinforced plastics, the ultra-violet light transmission of plastic, and the light transmission of glass. Until now, reinforced plastics materials were capable of transmission of only 55 to 65% of the visual light transmitted by air.

Experimentation by Corrulux Corp., Houston, Texas, has finally resulted in the development of Duralux, an almost-transparent reinforced plastic material that will transmit from 75 to 90% of the visual light transmitted by air, and thus compares closely with ¼-in. plate glass or ribbed glass in light transmission.

Duralux is now in a corrugated form to match commercially available corrugated roofing and siding sheets of metal or asbestos, and is being prepared for production in flat form with a commercially smooth finish for skylighting, wall lighting, shatter-proof window pane use, ceiling lighting panels, displays, etc. In its flat form it is said to allow the viewer to distinguish objects several miles away, yet possesses flexural strength in excess of 15,000 p.s.i., and has a loading capacity of over 100 lb. per sq. ft. on a 4-ft. span, 1/16-in. thick.

The new product, which is available in several colors for decorative use as well as in the standard daylight blue or infra-green for daylighting of buildings, contains two oz. of glass fiber per sq. ft. in the 1/16-in. thick standard form. This is approximately the level of reinforcement used in the regular translucent corrugated reinforced plastics sheets.

In application, the new transparent reinforced plastic can be sawed and drilled with standard hard-tipped tools, and is intended to be framed as is sheet glass for several applications. Patents on it and trade mark registration are pending.

In the illustration herewith, the left side of the window contains glass, the right side the reinforced plastic sheet. A 25-calibre bullet makes a clean round hole in the plastic, and a fast-pitched rock produces a local surface fracture, but does not break it. The glass is smashed by either attack.

Center panels show the comparative transparency of the glass and reinforced plastics sheets, indicating that this material opens the way for the manufacture of shatter-proof instrument panels, which can be easily read, shatter-proof industrial and commercial window panes, and many other applications which were heretofore impossible. For applications where transparency is not required, the manufacturer will continue to offer its translucent material known as Corrulux.

Reinforced plastic on the right shows only clean round hole from a bullet's entry and a local surface fracture from force of a thrown rock; glass on left is smashed by either

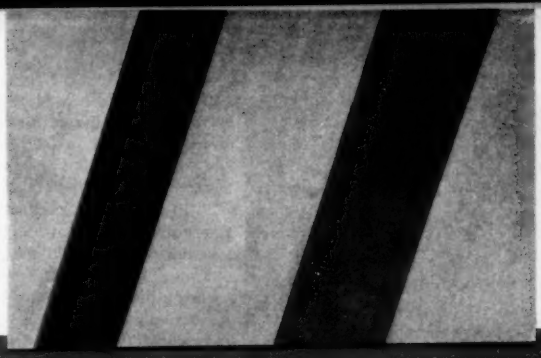
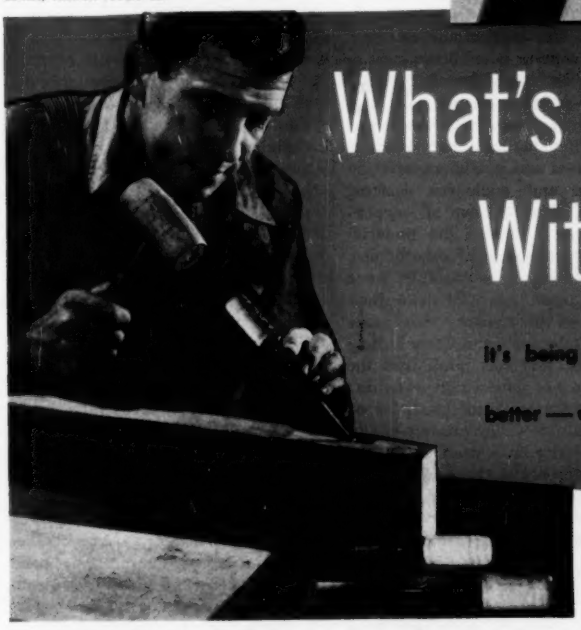


Fig. 1—Extruded rods of today (right) are stronger and clearer than those of two years ago (left)

Fig. 2—Chisel handles made of ethyl cellulose have proved their durability under severe impact tests

Courtesy Hercules Powder Co.



What's Happening With E. C.?

It's being made better, its prospects are better — and more of it is being made

Courtesy Hercules Powder Co.

Fig. 3—Strength and weather resistant qualities improve hedge clipper handle

IN THE 15 years that ethyl cellulose has been commercially available as a molding and extruding material, it has been subject to varying degrees of interest by molders and industrial end users. That interest has frequently been polemic: those who favored it were all for it; those who were against it were inclined to discount it completely. The favor or disfavor of the molder depended on his success or failure with ethyl cellulose.

Ethyl celluose has aways been a material of great promise. It's an ether, not an ester, so its latent ability to be compounded with very small amounts of plasticizer, introduced by the aid of heat and mechanical mixing alone, without intermediate colloiding steps, gives it desirable basic toughness and resistance capabilities.

There never was anything wrong with the economics of the use of ethyl cellulose: its low specific gravity, even at present prices, makes it comparable to other materials of similar impact strength and weatherability. But even as recently as two years ago this material suffered from three faults. First, there was the difficulty of coloring it. Second, it required a slow molding cycle. Third, there was an apparent lack of uniformity in the molding material. Through lack of knowledge, molders often found trouble in using it. It had to be improved if its destiny was to be fulfilled.

It has been improved! And with the improvement in the material has come increased interest on the part of molders, and consequent wider demand. The largest maker, Hercules Powder Co., Wilmington, Del., has just announced that it is doubling its capacity for the production of Hercocel E (ethyl cellu-

Courtesy Hercules Powder Co.

Fig. 4—Improved ethyl cellulose colors highlight stylish new steel tape holder

Courtesy Dow Chemical Co.

Fig. 5—Extruded refrigerator parts will maintain strength at low temperatures

Photos courtesy Dow Chemical Co.

Fig. 6—Thin-sectioned extruded parts used for refrigerator breaker strips

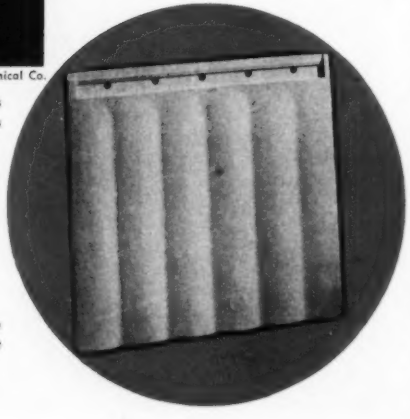


Fig. 7—Injection-molded ice-cream cabinet lid will resist repeated impact

lose molding powder). The time is now ripe to take a new look at this material.

Research Bearing Fruit

In military specifications, more and more frequent mention is being made of ethyl cellulose. At the same time, research and development over the past couple of years is suddenly bearing fruit in volume applications, while the promise is brighter for applications of even greater volume possibilities.

What has been happening quietly to ethyl cellulose in the past two years is that the flake producers, the molding material compounders, the molders and extruders, and the designers and engineers working with the material have all cooperated to revolutionize the material from the standpoint of ease of use. Improvements in moldability have resulted from improved flake. Better control of viscosity has made ethyl cellulose more uniform in flow properties, and has minimized the old disease of gels which were due either to unplasticized particles or contamination. Color properties and color stability have been vastly improved. Improved thermal stability of the base flake has for the first time made it possible to use reground scrap with or without virgin material, without loss of either initial color or physical properties. Higher density granulations have improved machine feeds and have stepped up cycles. Increased heating capacity has also brought about faster molding cycles and higher rates of extrusion. These factors of higher density and increased heating capacity have opened markets for moldings of ethyl cellulose with much larger areas.

The two makers of ethyl cellulose flake—Dow Chemical Co., Midland, Mich., and Hercules Powder Co.—both approached these problems of clarity, uniformity, freedom from gel, greater density, and higher heating capacity from the same direction.

Standards Upgraded

It was found that standards for the selection of raw materials going into the flake had to be upgraded. Cellulose had to be selected with greater care, and alkalies had to have proved uniform strength. In processing to molding material, the flake manufacturers had to classify lots according to haze and color in order that molding material makers need not use guesswork in amounts of dyes to be used. Formulas were improved by a minimum of mixing. Uniformity of plasticizers was established and amounts of plasticizers more carefully controlled.

Result: ethyl cellulose today molds rapidly and well in large area pieces on economical cycles with virtually no rejects, with excellent color values and surface appearance, and strain-free. Another result: more new applications being developed for ethyl cellulose, and more interest created in it.

There are now five manufacturers of ethyl cellulose molding materials: Hercules Powder Co.; Dow Chemical Co. (both of these make the basic flake); Westchester Plastics, Inc., Mamaroneck, N.Y.; American Molding Powder & Chemical Corp., Brooklyn, N.Y.; and Gering Products, Inc., Kenilworth, N.J.

In molding or extruding materials from any of these makers, satisfactory moldings should result if the three operating variables—mold temperature, material temperature, and speed of injection—are watched.

In molding ethyl cellulose, the temperature of the mold should be kept as high as possible, depending on the wall thickness and design of the part involved, but usually in the range of 140 to 170° F. Since ethyl cellulose molds best when molded at the highest possible temperature that can be obtained without discoloration or blistering, a good rule

of thumb in determining proper molding temperature for optimum molded properties is to heat the material until discoloration occurs, and then lower the temperature approximately 5 to 10 degrees.

Rapid Cycles

The new formulations of ethyl cellulose permit rapid molding cycles. It is wise to operate on the shortest cycle consistent with the production of satisfactory parts, because slow molding at lower temperatures may result in "rub-up" and unsatisfactory surfaces. High-heat, fast-cycle molding of ethyl cellulose is also a help in producing pieces with thin sections, where the physical properties of this material are advantageous.

Because of its extreme toughness, dimensional stability, impact resistance at low temperatures, chemical resistance, and weatherability, ethyl cellulose applications in the past have been concentrated in four major categories: tool handles and parts, refrigerator components, sporting goods and toys, and military devices. Never a cheap material per pound, it was used where it would do the most good, and generally where delicate colors were not involved. Now, with the new formulations on the market, ethyl cellulose not only is holding its former markets, but is going into new applications where its ability to be molded in thin sections, its ability to be molded in large areas, and its greatly improved color properties can pay off.

Tool Handles and Parts

A glance at Fig. 1 shows dramatically just what has happened to ethyl cellulose in two years. The extruded rod on the left—cloudy and dark—was made from material available two years ago; the rod on the right—clear and amber in color—is the newer material which, because of its purity, is even stronger than the former.

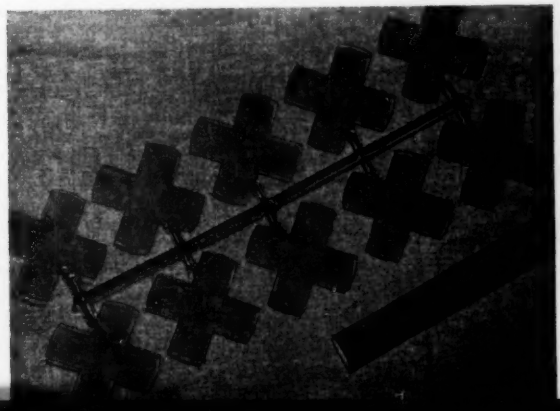
Tool handles of ethyl cellulose are either molded or machined from extruded rod. The molded parts being made today in bright colors are produced for carpenter's braces, screw drivers, and saws and other cutting tools; extruded handles are used mainly for chisels and mallet heads, where impact strength is a big factor. For the chisel handles and mallet heads, amber material is nearly standard. But reds, greens, yellows, and blues are claiming

Fig. 8—Molded golf club faces in a variety of colors are custom fabricated

All photos this page courtesy Hercules Powder Co.

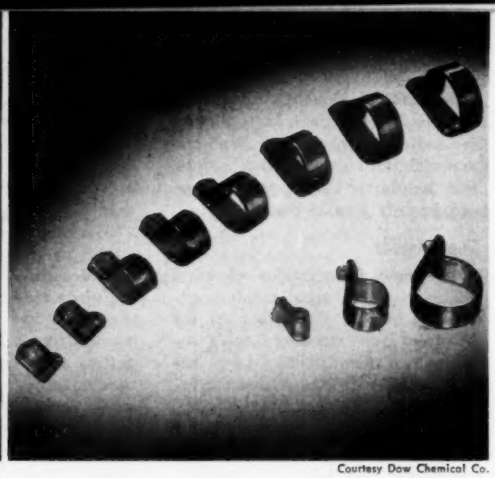
Fig. 10—Army uses material in telephone handset subject to severe exposure

Fig. 11—Shot from mold for rocket inhibitor (top); inhibitor strip (bottom)



Courtesy Hercules Powder Co.

Fig. 12—Lightweight vacuum cleaner parts of ethyl cellulose can withstand rough handling; unlike metal, they will not damage the surface of furniture



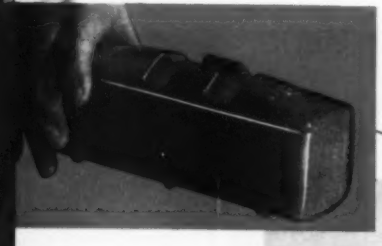
Courtesy Dow Chemical Co.

Fig. 13—Toughness of material and its ability to resist attacks by the elements are reasons for its use in cable clamps

a greater preference where other tools are concerned.

Figure 2 shows transparent extruded ethyl cellulose rod, fabricated into chisel handles for Stanley Tool Co., New Britain, Conn. Figure 3 shows a molded Hercocel E handle as used on the redesigned hedge clipper made by the Roberton Div., King Pneumatic Tool Co., Chicago, Ill. This handle, molded by Elmer E. Mills Corp., Chicago, is made in two sections, cemented in place. Weather resistance, toughness, and adaptability to a difficult assembly were the main reasons behind the selection of this material.

Ethyl cellulose recently made its first appearance in plastics housewares in injection molded handles for the "Best" stainless steel egg beater manufactured by Ekco Products Co., Chicago, Ill. While its high price presently prevents ethyl cellulose from gaining much of the housewares-components market, it is being considered for specific super-durable applications now that colors have improved. Another good example of this is the case for the Princess steel tape rule (Fig. 4), especially designed for use by women who sew. The case contains a 6-foot rule with an automatic friction brake to keep the blade extended to the desired length. Here the new ethyl cellulose colors allow the case to be made in ivory, blue, and yellow. Manufacturer and distributor is Carlson & Sullivan, Inc., Monrovia, Calif. The case is molded of Gering material by Modern Plastics Co., Los Angeles, Calif.



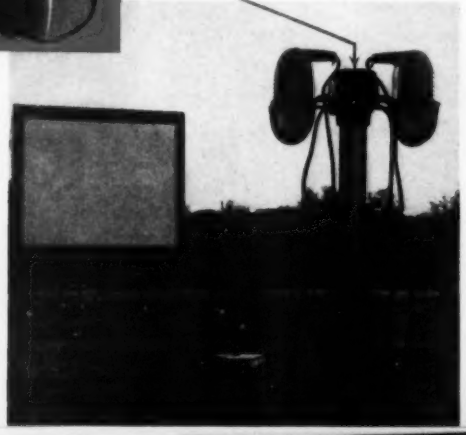


Fig. 14—Lack of need for refinishing makes ethyl cellulose housing (left) in use at outdoor theatres (below) more economical and practical than metal

Courtesy Hercules Powder Co.

Refrigerator Parts

The strength of ethyl cellulose at low temperatures has led to its wide use in extruded breaker strips. Dow has pioneered in this application, working with several extruders and almost every refrigerator maker. The thin-section possibilities, and the fact that complicated cross-sections can be extruded at high rates to close dimensional tolerances and with glossy surfaces, make the material a "natural" for the purpose. With the newer formulations, there is the added advantage of exact color matching; from the standpoint of economics, there is the fact that reground scrap can be used with no appreciable loss in physical characteristics or colors. Besides all this, the Ethocel extrusions are readily machined and punched with great economy, saving important money in assembly. Savings may be gaged by the fact that this relatively costly material competes with injection molded breaker strips of less expensive plastics.

There has been a parallel development of extrusion equipment and dies along with the development of better ethyl cellulose, in order that the full potentialities of the material might be utilized. Experience by Dow generally favors a closefitting

Courtesy Hercules Powder Co.

Fig. 15—Economical coated wires in blasting assembly resist crimping

screw with a torpedo having a plastic clearance of between 1/16 and 1/8 inch. A long machine gives better results than a short machine. Proper temperature control is an important consideration.

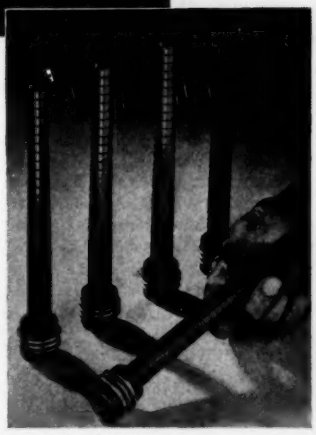
Figure 5 shows extruded Ethocel refrigerator parts produced by Presstite Mfg. Co., St. Louis, Mo.; Fig. 6 shows refrigerator and deep-freeze breaker strip sections now being made by Sandee Mfg. Co., Chicago, Ill.

Injection molded ethyl cellulose is also moving into the refrigeration field, where resistance to repeated impact under low temperatures is important. A case in point is shown in Fig. 7. This 22½-oz. piece is an Ethocel lid for an ice-cream cabinet, molded by General Products Co., Central Falls, R.I., for Savage Arms Corp., Utica, N.Y.

With the newer formulations of ethyl cellulose, it has been possible to get a perfect white for this purpose. Improved moldability has put the proposition on an economical press cycle, while the higher density granulations and increased heating capacity allow proper flow properties for producing such a large piece.

Sporting Goods and Toys

Soon after the close of World War II, when ethyl cellulose (the material was used in the proximity fuse) was available, while some other materials were not, it was used in a number of sporting goods and toy applications, and in several places where it could not hope to hold its



Courtesy Hercules Powder Co.

Fig. 16—Plastic bobbins have better resistance to moisture than wood

market in competition with lower-priced materials. That portion of the sporting goods and toy market retained by ethyl cellulose has been retained on the basis of quality alone. Again, the material development during the past two years is widening this market because of color advantage, speed of molding, and flow properties.

Golf club heads, for "woods," were developed soon after the war and are still in use; they are well accepted by golfers but resistance by manufacturers of golf equipment, caused by resistance from the golf professionals, has hampered the exploitation of this market. Recently, however, Hercocel E has been put to a new use in golf club heads. A. G. Spalding & Bros., Chicopee, Mass., is molding faces (Fig. 8) for golf "woods," then custom-fabricating them to fit individual clubs, attaching them with three Phillips head screws. This development has presented some technical difficulties since the ethyl cellulose combines well with only certain types of wood. Selection of wood, therefore, is important in the continued acceptability of the finished product.

While it is unlikely that ethyl cellulose will ever be able to maintain a place in the highly competitive toy market, there are hundreds of specialized toys where cost is secondary to quality, and where sheer strength is a major factor. Good examples are in the field of scale model components for miniature railroad kits and scale models of farm equipment which are sold as toys or used promotionally. Figure 9 shows scale miniatures of two Allis-Chalmers tractors, both molded of Hercocel E by Product

Fig. 17—New development foresees use of material in shotgun shells

Miniature Co., Inc., Milwaukee, Wis.

When producing miniatures of existing products, the manufacturer is primarily concerned with obtaining a faithful reproduction which will also reflect the durability of the product even when viciously abused by children at play. If the miniature does not stand up, there is implanted in the mind of the parent, a possible purchaser of the fullscale equipment, a connotation of lack of quality; hence the use of ethyl cellulose for built-in abusability.

Military Applications

The Armed Forces turned naturally to ethyl cellulose for use in several products produced in great volume during World War II. These

(*Continued on p. 195*)

Redesigned Humidifier

Has proved value of plastics in reducing weight and cost and in eliminating corrosion problems

AN ALL-PURPOSE humidifier, recently announced by Daffin Mfg. Co., Lancaster, Pa., makes excellent use of both phenolic and styrene in structural parts to keep costs low and quality high. This new unit, redesigned from an all-metal model, offers economical humidification in such industrial uses as in egg storage rooms, produce storage rooms, textile mills, and chemical plants, as well as in hospitals and the home. It is capable of evaporating over 3 lb. of water per hour at a power cost for its small electric motor of as low as 3¢ a day. All of the plastics parts in the unit are molded by American Insulator Co., New Freedom, Pa.

In working out the details of the all-plastic humidifier, Daffin wanted to get away from metals for a number of reasons. For example, one part of the motor mount, when machined from bronze, weighed nearly 3 pounds. The material cost was approximately 42¢ a pound, and this cost was more than doubled by the machining operations which followed. The same part, molded of Durez phenolic, weighs only half a pound and is used as molded, with no machining operations necessary. This same advantage was carried through in practically all the parts which the company converted from metals to plastics.

The base pan which also serves as a water reservoir was originally made of formed aluminum sheet. After forming, it was necessary to drill the required holes and to mill the recess where the wire passes over the top edge. This milled recess was sharp and it was therefore necessary to install a grommet to protect the wire. Finishing operations on the aluminum base pan were expensive: it had to be cleaned thoroughly and then surface-protected with two baked coats of enamel.

Even with the protection of the baked surface coating, the pan would frequently be scratched and the exposed metal would rapidly oxidize. In some cases, failure occurred in less than six months of operation where extreme corrosive conditions were encountered.

Styrene Parts

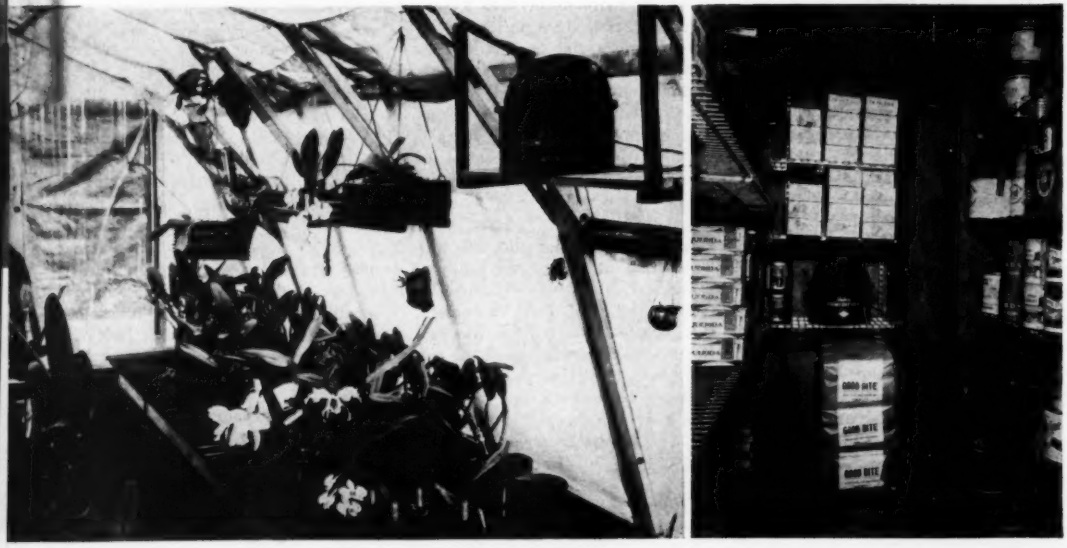
When the base pan was switched to injection molded styrene, troubles from corrosion were ended. Scratches would do no more damage than to mar the appearance. The styrene base pan has proved to be a better product; in addition, there are no after-machining operations, the use of a grommet is eliminated, no surface coating is needed.

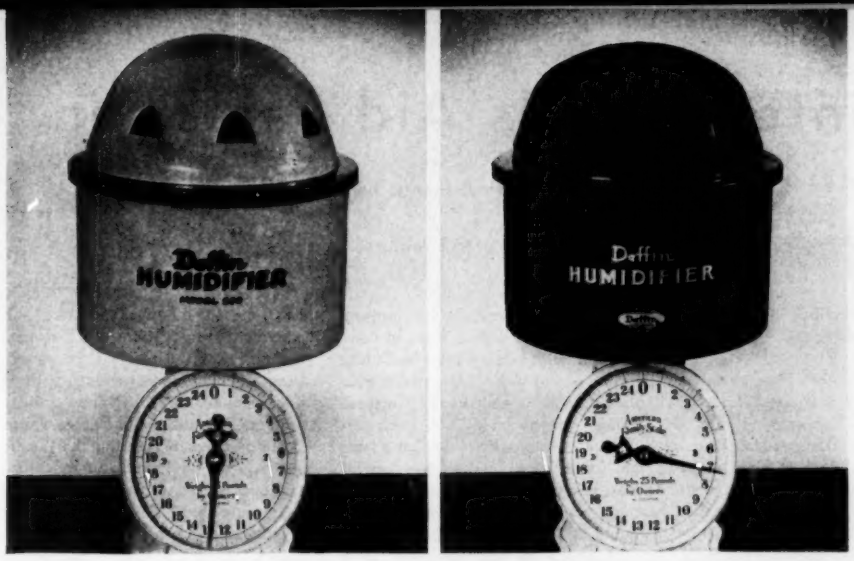
The cover for the humidifier, with holes through which the vapor passes, is also injection molded of Bakelite styrene.

Third element of the humidifier to make use of molded styrene is the impeller and the impeller pump, which are mounted on the motor shaft. One of the greatest advantages found in this material use is the light weight of the completed impeller. The lightness permits

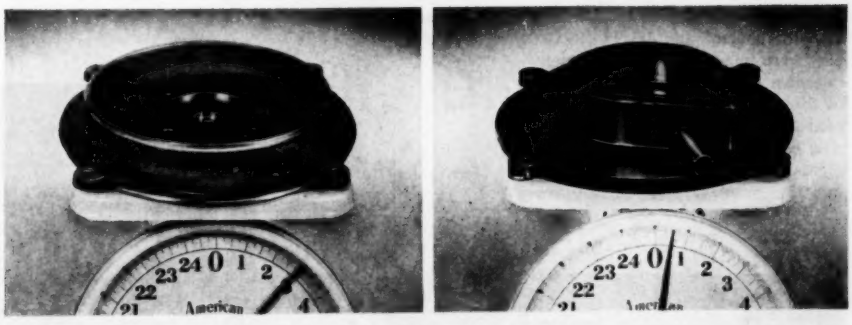
Redesigned humidifier, making use of both phenolic and styrene in structural parts, has numerous industrial and commercial applications in economically humidifying textile mills, chemical plants, greenhouses (left) and storage rooms (right)

Photos courtesy Daffin Mfg. Co.





Change-over in construction of humidifier from all-metal (left) to styrene and phenolic (right) not only effected greater savings in production costs, but resulted in a more durable product weighing just over half as much as metal predecessor



Machined metal casting (left) is nearly six times as heavy as the same part made of special heat- and moisture-resisting phenolic (right). Use of the plastic material eliminated the previous need for expensive finishing operations

mounting the armature of the motor below the magnetic center. Then, when the motor is energized, the armature, virtually unimpeded by the light weight impeller, is drawn toward the magnetic center, thereby eliminating practically all thrust on the motor bearings.

Phenolic Parts

A special heat- and moisture-resisting Durez phenolic was selected for molding the motor hood and mount, as well as the center pan which supports the motor and the housing. Screw inserts are molded into the center pan. No finishing is needed other than flash removal.

In addition to having longer life, lower cost, and lighter weight than its metal predecessor, the plastics humidifier is reported to run more quietly and with much less vibration.

The unit is finding wide acceptance not only as a means of increasing humidity wherever required, but also for vaporizing other liquids than water for special purposes. For example, units have been installed in felt manufacturing plants for moth control. In this operation, a predetermined amount of cedar oil is introduced into the unit and vaporized as required.

Courtesy Durez Plastics & Chemicals, Inc.

Molded phenolic parts of humidifier are motor hood, motor mount, and center pan

Printed Panels Aid Salesmen

Illuminated panels of rigid vinyl sheets, heat formed over original wood carvings, are central features of display unit

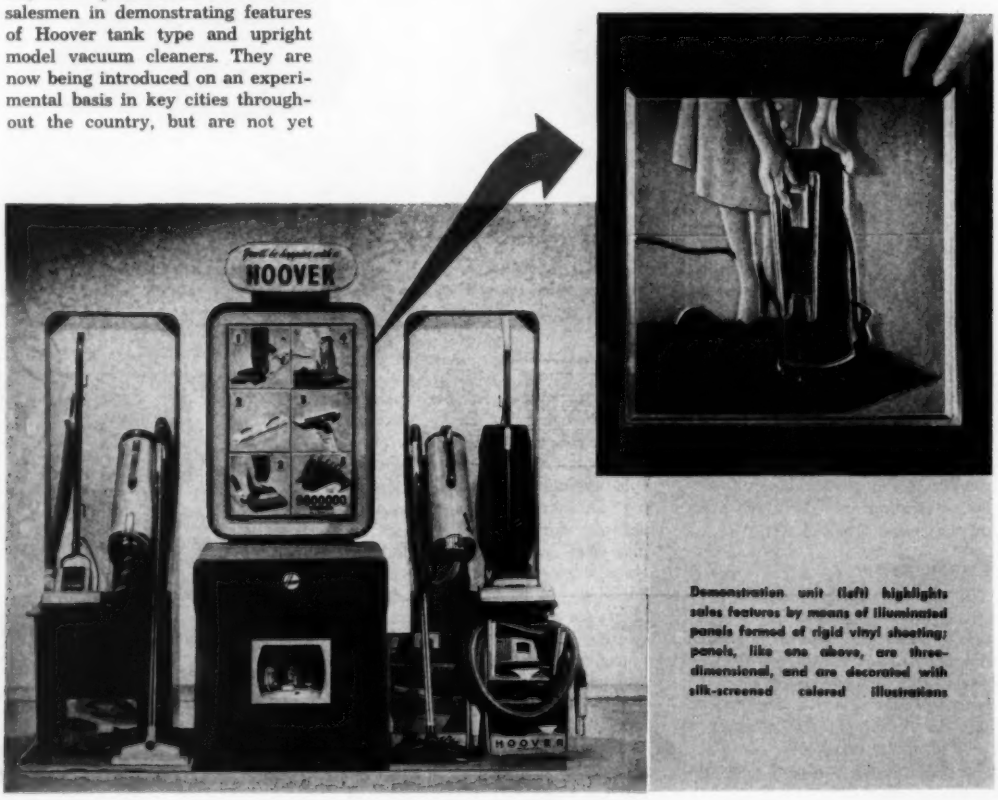
MANUFACTURERS have given increased attention in recent years to the development of functional point-of-sales demonstration units which augment the efforts of the salesman by dramatizing essential features of the product. Successful displays of this type must occupy minimum floor space and must have the power to attract the attention of prospective buyers.

Particularly interesting in their effective use of vinyl plastic are the new demonstration units designed and produced by W. L. Stensgaard & Associates, Inc., Chicago, Ill., for The Hoover Co. These units, made in both standard and de luxe models, were planned to assist retail salesmen in demonstrating features of Hoover tank type and upright model vacuum cleaners. They are now being introduced on an experimental basis in key cities throughout the country, but are not yet available for general distribution.

The standard unit is used in conjunction with one display including both types of cleaners, while the de luxe model, more lavishly finished, is used with two side units, each displaying two cleaners—one tank type and one upright. Both types permit considerable flexibility of arrangement to meet the space requirements of individual stores.

Highlight of the displays is a group of six backlighted vinyl panels showing important sales features of the cleaners. The panels, measuring approximately 10½ in. square and consisting of 60-mil rigid Vinylite sheet material, have silk screened illustrations in several colors. After the printing operation, they are formed to produce a third dimensional effect which greatly enhances attention and sales value.

Molds used in forming the plastic sheets after application of the illustrations and lettering are original wood carvings. The heated sheets are formed against a male die by means of air pressure; no female mold is required. Above the six sales feature panels is a similarly formed oblong panel carrying the statement, "You'll be happier with a Hoover."



Demonstration unit (left) highlights sales features by means of illuminated panels formed of rigid vinyl sheeting; panels, like one above, are three-dimensional, and are decorated with silk-screened colored illustrations

Interval timer has case, knob, and pre-set ring injection molded of styrene on 8-oz. Reed-Prentice press

Exposure timer and interval timer have two identical styrene parts—case and pre-set ring; hand knob differs

Timers for the Darkroom

Interval timers have smartly styled cases, setting knobs, and rings molded of styrene for beauty and economy

TWO timing mechanisms for photographic darkroom use—an automatic exposure and an interval timer—are good examples of intelligent production economics on the part of the manufacturer, The FR Corp., New York, N.Y. Both timers have three plastics components, two of which—the case and pre-set ring—are identical in each. The third is a hand knob.

All three components are made of styrene, which resists the corrosive action of photographic chemicals. The styrene, supplied by Bakelite Co., is injection molded in an 8-oz. Reed-Prentice press. The case is produced in a 2-cavity, cam-actuated press; the knob in an 8-cavity die; and the ring in a 4-cavity die. Although the same case is used for both timers, it is made in grey for the exposure timer and in black for the interval indicator. Pre-set rings are clear styrene; knobs are red.

In the knob, the one component that is different in both timers, the triangular arrow is wiped-in for the interval timer, and sprayed on for the exposure timer.

The exposure timer indicates intervals in seconds; the dial is marked from 1 to 50. It plugs into any AC receptacle, and operates to control the light in any enlarger or contact printer. After the desired number of seconds for the exposure has been completed, an automatic clock mechanism in the housing shuts off the light source.

New feature of this FR Timer is a pre-setting ring which can be set to any time interval up to 50 seconds. Then the knob is turned until the two arrows on the pre-setting ring and the knob coincide. The knob stops at this point. Turning the knob winds the timing mechanism but the latter does not start to run until a button on top of the case is pushed. This button is a safety control so that the enlarger or printer can be checked after the timer has been set but before it starts to run. The same time interval can be repeated without resetting the ring by simply turning the knob and pushing the button.

Accuracy of the timer is within the latitude of photographic papers, with a possible variance under 5 percent. Its operation is not affected by variations in electrical current or temperature.

The FR Interval Timer has the same pre-set ring, which can be set for any time interval from 1 to 60 minutes. First the ring is set for the desired interval; then the knob is turned to that interval (it cannot go past the ring setting). The knob winds the timing mechanism in the case, which rings a bell when the desired interval has been completed. The same interval can be repeated any number of times without resetting the ring—an advantage when working in the dark.

Photos courtesy American Cyanamid Co.

(Left) Molds used to make core-drying trays. (Center) Reinforced plastic tray as it comes out of mold. (Right) Tray after sand core has been blown in

Catalyzed polyester resin and styrene-treated fibrous glass are alternately loaded in mold to build it up to desired thickness

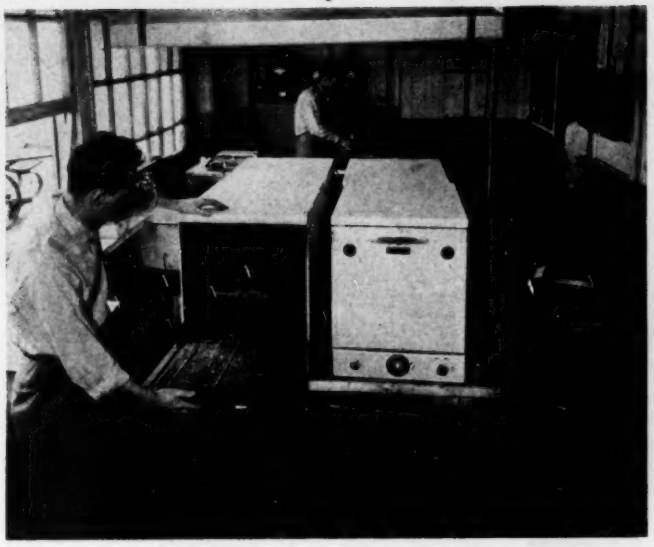
Foundry Core Driers

Simple equipment is used to produce reinforced plastic forms which permit electronic baking of sand-urea cores

Cavities of the cured drier are scraped with slimtaper files to the required tolerances after burrs and irregularities have been sanded away with a garnet paper power wheel

THE ADOPTION of fibrous glass reinforced polyester resin for driers and coreboxes has greatly expanded the use of electronic baking of foundry cores made of sand and urea resin. Until recently, electronic baking was practical only if the cores were of relatively simple shape. This limitation resulted from the lack of a suitable material for the trays or driers used to support the cores passing through the oven.

Such driers must be made of a material which does not conduct high frequency current. This eliminates cast aluminum, which is used for driers in the conventional core drying operation. Various non-metallic materials can be used for electronic baking when only a flat plate is required to support the core. But most such materials could not be formed to the shapes required to support more intricate cores.



Assembled molds are weighted with 50- to 100-lb. iron blocks and then placed into ovens to cure. Ordinary household electric ranges can be used if mold is small enough

In addition to non-conductivity and formability, the material used for driers must be capable of withstanding the impact and abrasion of the blowing operation. At the blowing station, the sand and resin mixture is blown into a mold formed by the drier and a matching piece known as the corebox, which is fastened to the head of the core-blowing machine. This piece, too, is now being made of reinforced polyester.

The plastic driers and coreboxes now being used in some foundries are molded right on the premises with simple equipment. The molds are aluminum with a steel frame.

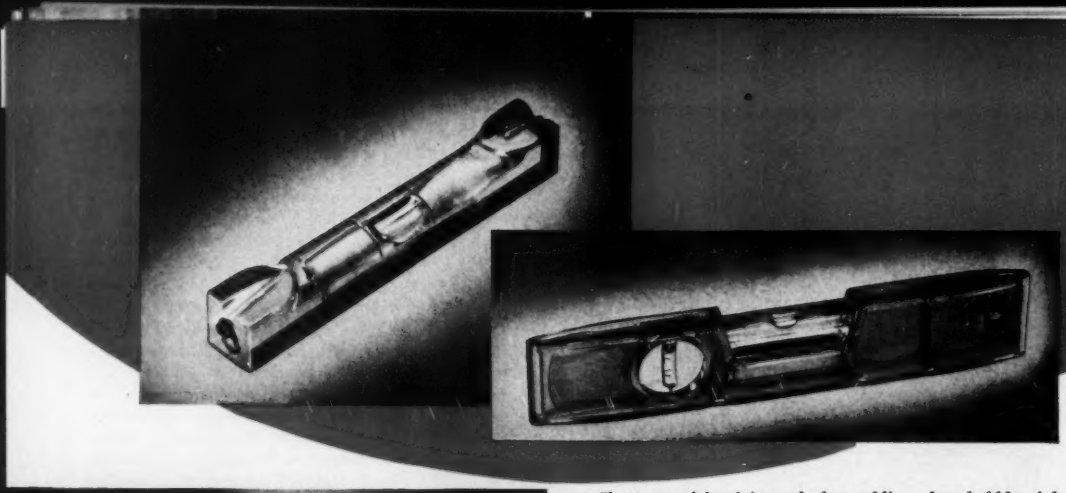
First step in the production of the driers is the application of a parting agent, Vejin, to the mold surface with a brush. The mold is then loaded with alternate layers of catalyzed Laminac resin and 1.5-oz. styrene-treated Fiberglas mat. The assembled mold is weighted with 50- to 100-lb. iron blocks, placed in an oven, and cured at 325 to 350° F. for 30 to 45 minutes. If the mold is small enough, the oven of an ordinary electric range can be used.

On the driers used for machine blowing, more than half the cost of the reinforced plastic part comes from the finishing operations required after molding. Burrs and irregularities are sanded away with a garnet paper power wheel. Then the cavities of the drier must be scraped to the proper dimensions with slimtaper files. This is necessary because variations in shrinkage and warpage during the molding process make it impossible at present to produce finished parts to the necessary tolerances.

Work is now being done to minimize the variations in shrinkage during the molding process so as to reduce finishing costs. Some foundries are considering molding the driers in hydraulic presses so as to make possible cycles of 3 to 4 min. instead of the present 30 to 45 minutes. The resultant economies might well justify the investment in presses.

Baked cores are carefully inspected as belt carries them out of electronic oven

Trays are taken from blow station and placed on a conveyor belt to the oven



Shatterproof level is made by molding glass bubble vial into a solid piece of acrylic. The acrylic protects the vial from shock and, at the same time, magnifies it. Visibility, particularly from below, is improved as compared with levels with opaque wood or metal bodies. Pocket line level is 3 in. long. Larger model, 9 in. long, has butyrate body with two acrylic-protected vials cemented in. Manufactured by Creative Plastics Corp., Stony Brook, N.Y.

PLASTICS

Hand puppets with realistic appearance and skin-like feel are slush molded of vinyl plastisol. Sixteen different types of hand puppets are made, including boxers, Alice in Wonderland, Bob Hope, and Howdy Doody characters. Doll puppets, including Alice, Goldilocks, and an Indian princess, have saran wigs which can be combed, washed, braided, or curled. Made by The Jay V. Zimmerman Co., 320 N. Leonard Ave., St. Louis, Mo.

Scrub brush with extruded styrene bristles outlasts ordinary brush five to one. The plastic bristles stay stiff even when soaked, will not rot, will not mildew, and will not mat. They can also be cleaned by simply dipping in warm suds. The Bakelite styrene monofilament bristles are set in a 9 by 2½-in. honey maple block. Made by Empire Brushes, Inc., 200 William St., Port Chester, N. Y.

Permanently inflated Christmas tree ornaments are made of 8-gage vinyl film. Some of the colorful ornaments are oval or bell-shaped and have scenes or characters decorated on them. Others are made in shape of Santa, locomotive, angels, etc. All are light in weight, can be used as crib or tub toys. Made by Chevron Corp., 250 N. Water St. Milwaukee, Wis.

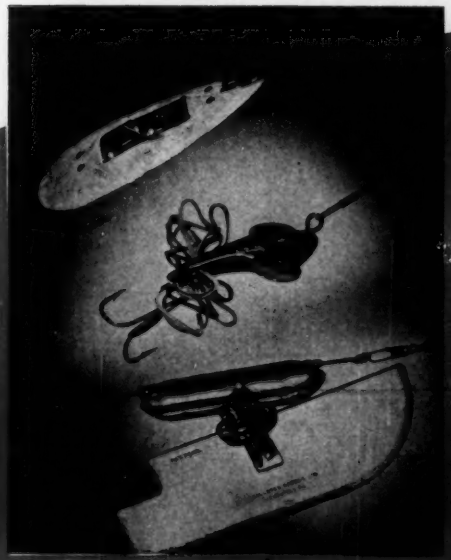
Dice game is housed in a styrene case with transparent top. The dice, fabricated of Catalin cast phenolic, are on a spring-driven turntable, and are tripped by lugs molded-in to the sides of the case. The case is molded by Jamison Plastic Corp., Freeport, N. Y., for the Keiler Corp., 723 Glenmore Ave., Brooklyn, N. Y.

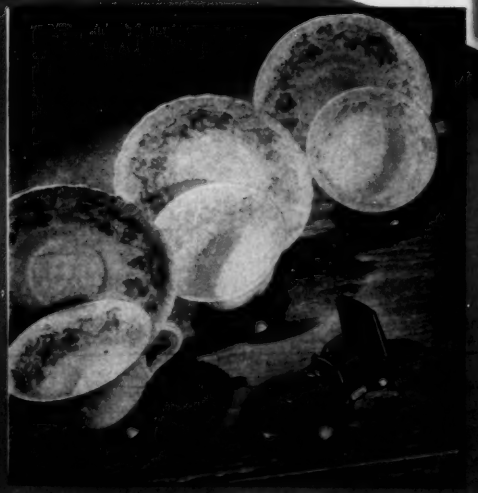
PRODUCTS

Inflatable hats called Loony Lids are made of 10 and 12-gage vinyl. The hats, which look like outlandish animal heads, fit snugly on a child's head and fasten under the chin. An elephant, horse, lion, and rooster are included in the line. All measure 28 by 14 in. when inflated and are decorated in bright colors. They can also be used as party hats for adults. Made by Ideal Toy Corp., 200 Fifth Ave., New York, N. Y.

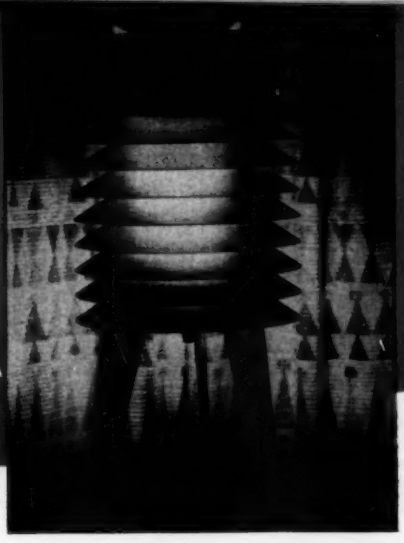
Two versatile new fishing lures and an off side vane for trolling are molded of Tenite II cellulose acetate butyrate. The transparent vane will hold line and bait as much as 27 ft. off side. The adjustable wing lure can also be set for use as surface or deep running bait. The other lure combines spoon and spinner action. Molded by Fer-Bar Plastics Co., 1020 Elk St., Franklin, Pa., for Challenge Tackle, Inc., 28 Arch St., Meadville, Pa.

Stand for cup and saucer displays fine china to best advantage. Saucer is held in upright position behind cup, which can be set in either of three positions: standing, lying on its side to show the interior, or tilted at an angle. The unobtrusive holder is molded of mahogany colored styrene. It is manufactured by Hold-Rite Co., 262 Briggs Bldg., Birmingham, Mich.





Outlet safety plate makes it impossible for children to insert objects in the outlet. Spring-actuated disk snaps to a closed position when plug is removed. Plug can be inserted by turning disk one quarter turn with prongs of the plug. Molded of white or ivory high impact styrene by Gits Molding Corp., 4600 West Huron St., Chicago, Ill.

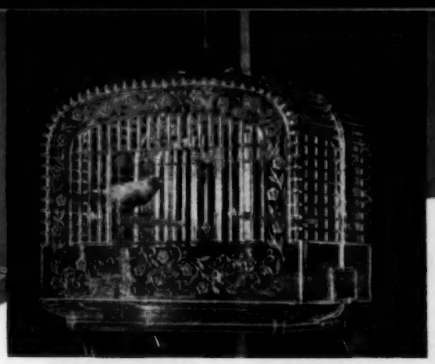


Unusual modern desk lamp has eleven circular louvers molded of black phenolic. Suffused light from the 100-watt bulb makes the opaque louvers look transparent. The lamp is 6 in. in diameter and 13½ in. high and has aluminum legs. Available from Gottschalk Sales Co., 225 Fifth Ave., New York, N. Y.

PLASTICS

Inflatable pillow that can be worn like a collar provides sleeping comfort for travellers or others who nap sitting up. The pillow is made of flexible laminated Vinylite film embossed with a taffeta texture. When deflated, the pillow folds to purse size. Available in clear or plaid material from Purofied Down Products Corp., 350 Fifth Avenue, New York, N. Y.

Wallets made of 20-gage vinyl are decorated with bas relief designs by new process which gives the designs solidity as well as relief. Instead of leaving the underside of the raised designs hollow, the process fills them with liquified vinyl material which is electronically solidified and bonded to the wallet. Thus the design does not flatten out if compressed and has a richer, solid feel. Manufactured by Eastern Fiberboard Plastics, Inc., 227 Aster St., Newark, N. J.



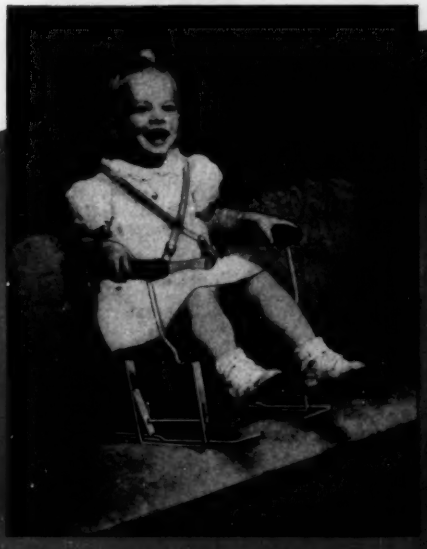
Easily washable, completely transparent bird cage is molded of Lustrex styrene. The cage and all its parts can be washed as easily as a dish, and there is no danger of rust or chipping. The bird is always in full view. The cage is 15 by 12 by 9 inches. Made by Bernard Edward Co., 5252 S. Kolmar Ave., Chicago, Ill.

PRODUCTS

Chairs and sofa in American Informal Group are upholstered in Velon fabric. The Bamboo pattern material used is woven of 10-gage saran monofilaments and has a "furniture finish." It is softer, less glossy, and more flexible than the saran fabrics used for auto seat covers. Material is woven by Hafner Associates, Inc., 350 Fifth Ave., New York, N. Y. The furniture is manufactured by Tomlinson, 305 West High St., High Point, N. C.

Children's auto seat is upholstered in Lumite woven saran fabric, the same material used widely for auto seat covers. The saran fabric is scuff-proof, long wearing, and easily washable. The seat, called the Comfysafe, is made by Toidey Co., Fort Wayne, Ind.

Whisk brooms have durable heads molded of Tenite I cellulose acetate. The heads are designed so that they serve to lock the straws in place. They are light in weight, colorful, and pleasant to the touch. The molded heads are made by Hagen-Jones Mfg. Co., Paris, Ill.



New Machine With Screw Pre-Plasticizer

Screw-powered pre-plasticizer will also be available as conversion unit for other injection machines

NEWEST development of the Plastics Div., Jackson & Church Co., Saginaw, Mich., is a screw type 16-oz. horizontal injection press featuring J-C's Hendry pre-plasticizing process. This machine has recently been placed in operation in the Plastics Dept., Electric Auto-Lite Co., Bay City, Mich. At present the machine, on which Jackson & Church has a patent pending, is producing elastomeric vinyl nipples for automotive distributors in a 60-cavity mold operating on a 40-sec. cycle and running three 8-hr. shifts daily, five days a week.

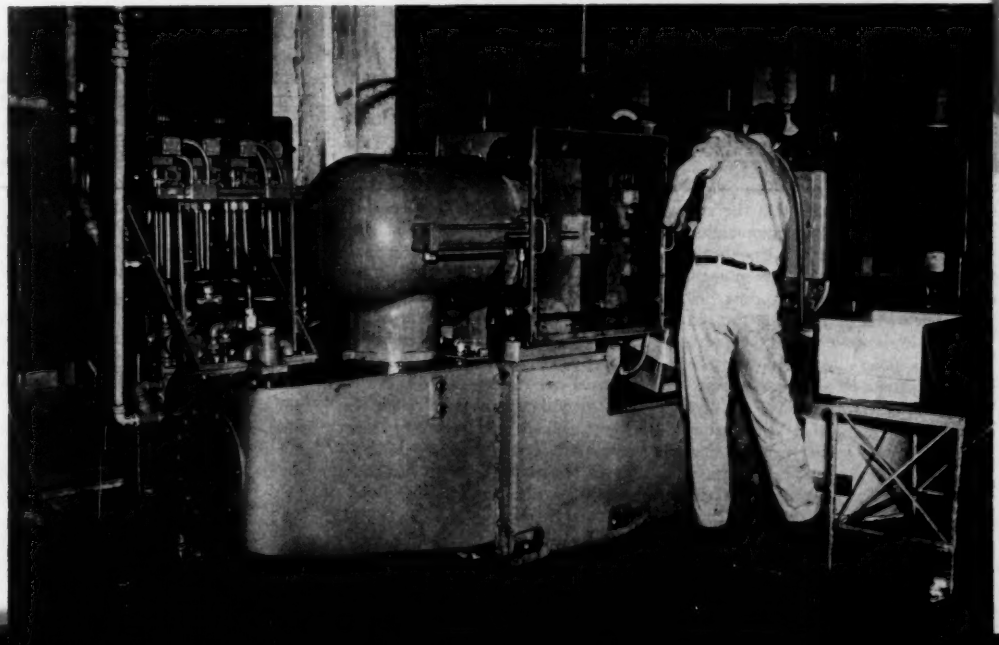
Except for its pre-plasticizer assembly, which is mounted at right angles to the injection chamber, the machine is basically similar in appearance to standard horizontal types. However, the Hendry pre-plasticizing process uses no torpedo in the injection chamber, depending upon the pre-plasticizer to plasticize the material and transfer it to the chamber, ready to be injected into the mold.

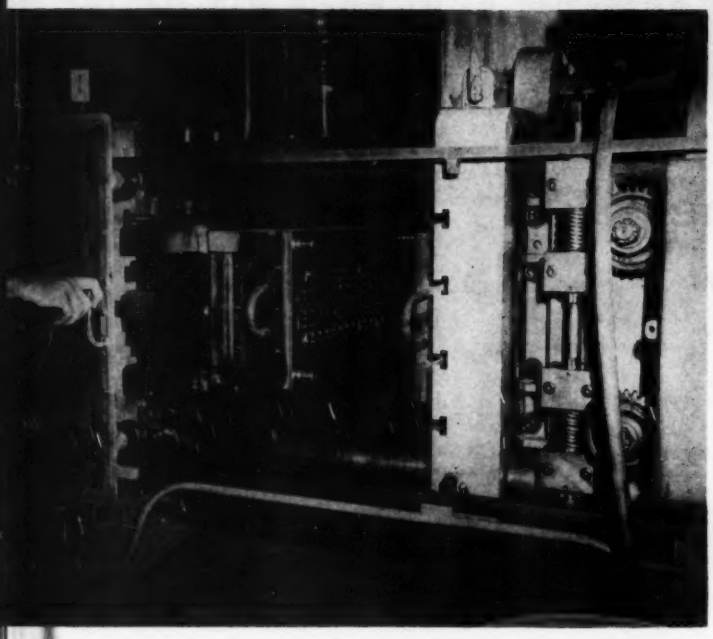
Variable Pitch Screw

The design for the variable pitch screw used in the pre-plasticizer was the outgrowth of extensive research and experimentation. Extending from the hopper to the injection chamber of the press, the screw operates at pre-adjusted speeds to mull the plastic material prior to injection. This results in thorough mixing and heating, permitting the material to be injected into the die at lower pressures and temperatures than those required in conventional injection machines.

The pre-plasticizing chamber, equipped with two independently controlled heating zones, makes the machine particularly suited to the

New 16-oz. injection machine in which the pre-plasticizer assembly is mounted at right angles to injection chamber. Controls on the left regulate the two temperature zones of the pre-plasticizer and also the single heat zone of the injection cylinder





Vinyl distributor nipples are produced in this 60-cavity die on new machine; mold automatically strips the complete molded shot off the cores as the die is opened

handling of flexible vinyl materials, producing molded parts of exceptional gloss and finish. The lower temperatures involved protect the material against decomposition and discoloration, while the vigorous mulling action insures complete plasticization and promotes the molding of uniform, strain-free parts. The pre-milling feature also permits the unit to be used for dry coloring of styrene and other thermoplastic materials, and is important in reducing molding cycles.

The extruder screw, designed for maximum mulling efficiency, is of the multi-stage type. The screw flights are so designed that the rate of feed is at maximum immediately below the material hopper; the flights are more closely spaced as the injection chamber is approached, thereby gradually reducing the volume of material handled per turn. Running along the entire length of the pre-plasticizer cylinder are electric strip heaters, divided into two individually controlled temperature zones. As the screw rotates, compressing and heating the plastic, it constantly brings new parts of the material into contact with the heated cylinder wall. The frictional heat produced by the action of the screw augments that from the two 4-kw heaters, insuring complete and uniform plasticization.

Optimum Heat Absorbed

Since the screw is so designed that the material will absorb the optimum amount of frictional heat for the particular plastic being molded, the pre-mill unit is actually a constant viscosity rather than a constant temperature device. The injection chamber itself has one uniform heat zone, designed to maintain a holding heat for the pre-plasticized material. On the 16-oz. machine, this is obtained with strip heaters having a total capacity of 4-kw and independent temperature control.

In the conventional type injection machine, the injection chamber is theoretically divided into three principal zones. The first zone contains granulated material from the hopper which has not yet been heated, the second has a combination of plasticized and unplasticized material, while the third zone contains fully plasticized material ready to be injected into the mold. When the injection ram operates, much of its energy is required to move the material in the first two zones of the chamber against the resistance of the torpedo and the side wall of the injection cylinder.

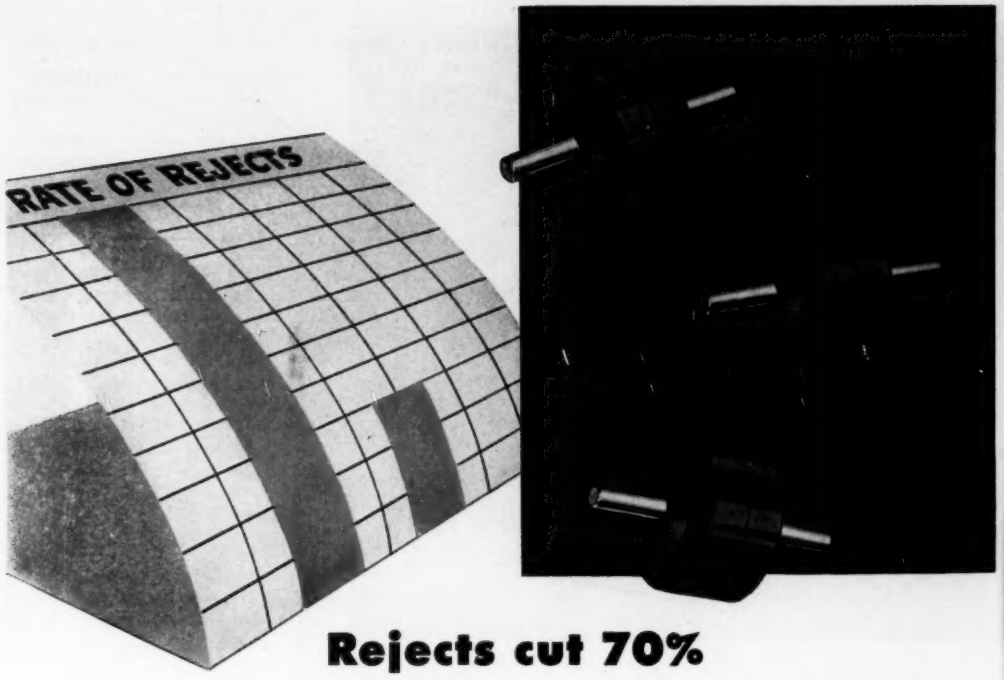
With the J-C machine, the unobstructed injection chamber is filled with completely plasticized material, and virtually the entire charge is injected at each shot. On 16-oz. machine, injection chamber holds about 17 oz., affording small over-capacity.

After leaving the pre-plasticizing screw and moving into the injection chamber, the viscous material is shot into the mold by a hydraulically operated injection ram. The 16-oz. machine has an injection cylinder 5 in. in diameter with an 8-in. stroke. Pressure exerted on the material in the injection chamber is 14,000 p.s.i., while the locking pressure on the clamp is 225 tons. The clamp cylinder is 17 in. in diameter and has a 14-in. stroke. Clamping of the mold is by straight hydraulic action, involving no toggle joints or levers.

Functions are Automatic

In starting the press, the die may be left open and the screw operated until the material has reached molding temperature, as determined by checking with a pyrometer as the material is forced out of the nozzle. Once the machine is in operation, all mechanical functions are automatic. Operation is actuated by a roller-mounted safety gate with acrylic panel, affording full visibility at all times. Centralized controls, located on the right side of the machine, are provided with a cover to be locked for safety during set-up operation.

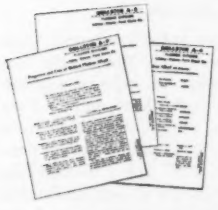
Delivery of the plastic material from the pre-plasticizer worm to the injection chamber is regulated by two limit switches. After the die is closed, there is a delay for clamp pressure buildup, then the ram injects the material into the mold and retracts. However, it does not retract fully, but only far enough to uncover an opening in the injection chamber through which material from the screw is delivered, at which point the first limit switch is actuated. Pressure is automatically taken off the injection ram and it remains at rest. Simultaneously, the belt-driven pre-plasticizer screw,



Rejects cut 70%

Like so many manufacturers, Globe-Union, Inc., received substantial rewards in a hurry from a simple switch to Plaskon Alkyd Molding Compound. In their television high-voltage capacitors, the outstanding electrical properties of this quick-curing plastic reduced rejections 70% when the parts were submitted to a high-voltage breakdown test. This manufacturer also reports: "Very appreciable labor savings have resulted from the use of Plaskon Alkyd" ..."Plaskon Alkyd has at least doubled the productive capacity of molding equipment"..."The life of molding dies has been increased."

Again... *faster, more economical production* of an *improved* product — thanks to Plaskon Alkyd. Again... important evidence that it might pay you well to investigate Plaskon Alkyd in relation to *your* product.

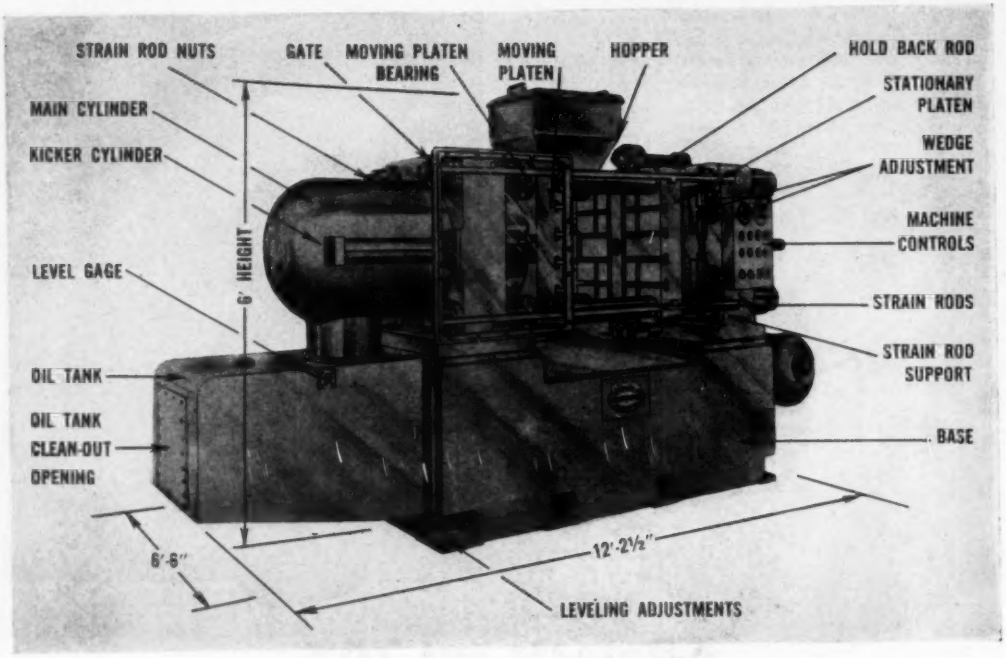


New bulletins giving complete details of the many important properties of Plaskon Alkyd Molding Compound are now available. Write for them now!

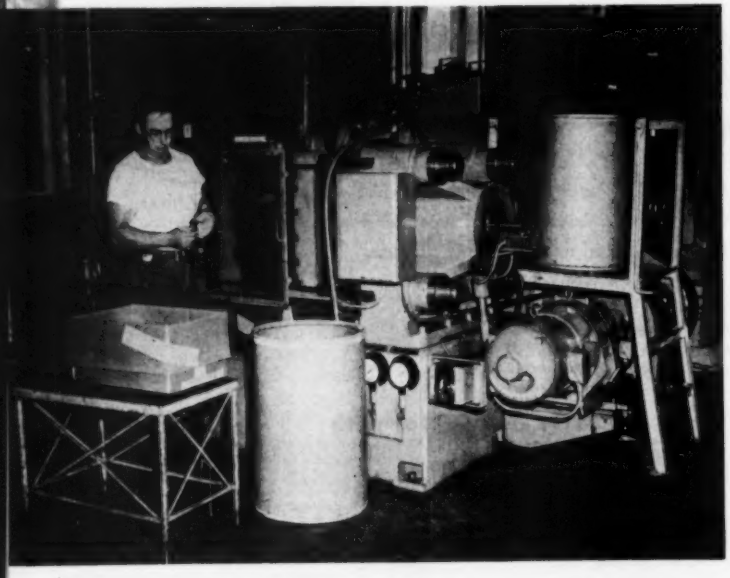
mold it better and faster with

PLASKON DIVISION • LIBBEY • OWENS • FORD GLASS COMPANY
2121 Sylvan Avenue • Toledo 6, Ohio
In Canada: Canadian Industries, Ltd., Montreal, P. Q.
Branch Offices: Boston, Chicago, New York, Rochester, Los Angeles
Manufacturers of Molding Compounds, Resin Glues, Coating Resins

PLASKON®
ALKYD



Features and dimensions of the new 16-oz. pre-plasticizing injection molding machine. Cycle is actuated by the closing of acrylic safety gate and all mechanical functions are automatic; controls are centralized on the right for easy operation



Molded nipples are stripped by operator from sprues which are reground and used in molding of additional parts; roller-mounted safety gate is closed to start next cycle

powered by a 15 hp. motor, begins to operate. As the injection chamber fills with viscous material, the ram is pushed back until it energizes the second limit switch, stopping the screw. At this time pressure is trapped in the cylinder by a gate block at the nozzle of the machine, thereby eliminating any possibility of spill-over at the nozzle and introduction of vacuum bubbles in the injection chamber.

Automatic Operation

The system is fully automatic and self-compensating. The screw can operate during the hold time of the press, the opening time, and the time required to remove the parts from the press, providing the fastest possible cycle time. The chamber fills automatically; no timers or hopper feed settings are required to handle this phase of the operation.

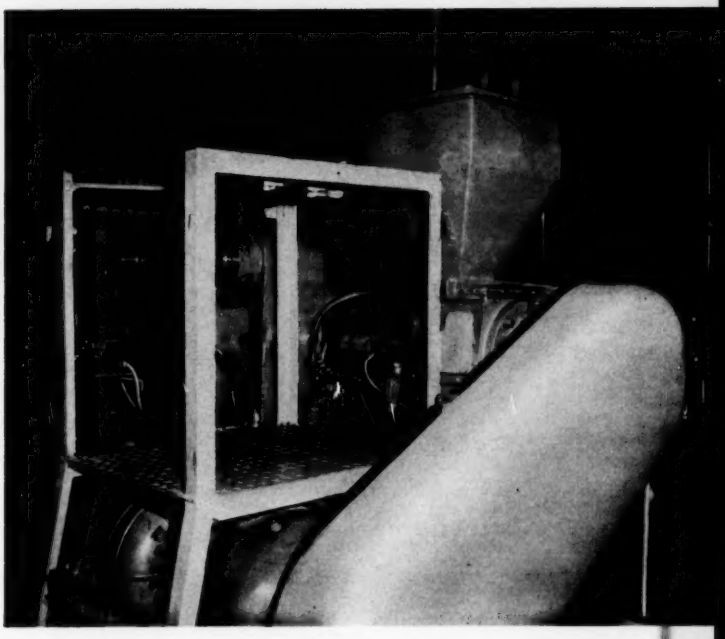
The extruder on the J-C machine is equipped with a variable speed drive to increase the adaptability of the machine to various molding materials. On the Auto-Lite vinyl job,

the screw runs at top speed while the press is operating.

The 60-cavity chrome plated die being run on Auto-Lite's 16-oz. machine produces a shot weighing 11 oz., including sprue and runners. When the machine was first installed, the cycle was run experimentally as fast as 28 sec., but this did not give the operator sufficient time to remove the sprue and degate the pieces between shots. The job is now normally run on a 40-sec. cycle, producing complete shots of excellent color and high gloss. Auto-Lite plastics officials attribute the results to the complete plasticization of the material and the relatively low molding temperature required. In running these parts previously on a conventional injection machine not equipped with J-C pre-plasticizing, and on the same cycle, Auto-Lite had difficulty getting complete shots and found it necessary to block off six or eight of the end cavities.

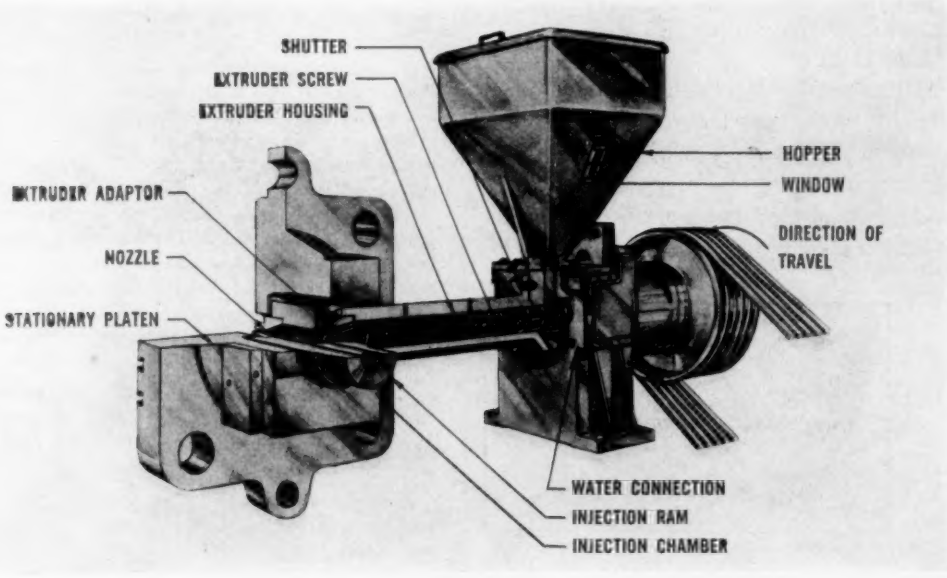
The material now being run on this job is black Vinylite No. 7734. Both virgin granules and reground sprue material are used without a noticeable difference in the appearance of the finished parts. The mold,

(*Continued on p. 122*)



Screw-type pre-plasticizer assembly just beneath hopper is powered by a motor under end of injection cylinder; housing on right shields the belts driving extruder unit

Screw, running from hopper to injection chamber of pre-plasticizing machine, operates at pre-adjusted speeds to mull the material prior to its being forced into injection chamber and shot from there into mold by means of a hydraulically operated injector ram



situation's well in hand with closures and packaging molded of Beetle® plastic

Sales appeal in color... beautiful BEETLE colors that go through from surface to surface... they won't fade, peel or crack.

BEETLE (urea-formaldehyde molding compound) is durable, too... resists scratches and wear... won't melt or soften under heat... *won't attract dust*. And cleans easily with a whisk of a damp cloth.

All this, plus lightweight, high impact strength, no taste or odor, resistance to alcohol, common solvents and essential oils, makes BEETLE outstanding for closures and packaging, and *naturally*, appliance housings and handles.

Fit BEETLE into your product. May we help?

AMERICAN *Cyanamid* COMPANY
PLASTICS DEPARTMENT
32 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

In Canada: North American Cyanamid Limited, Royal Bank Building, Toronto, Ontario, Canada

Looking for

DEPENDABLE "EXPENDABLES"?

A TOOTH PASTE tube cap, a button, or other "expendable" item—representing only a fraction of a product's cost—can play a vital role in forming the public's opinion of a manufacturer and his products. Bright colors and unique design can stop the shopper. But, if the tube cap cracks or reacts unfavorably with the contents . . . if a button fades or melts over a costly gown . . . good will quickly turns to ill will.

An interesting example of how a very small investment paid off handsomely is the crown-shaped tire valve cap molded by Formold Plastics for Standard Oil of Indiana. These inexpensive replicas of the company's Red Crown symbol are used as "give-aways" by Standard Oil dealers, and have proved very effective in building customer good-will.

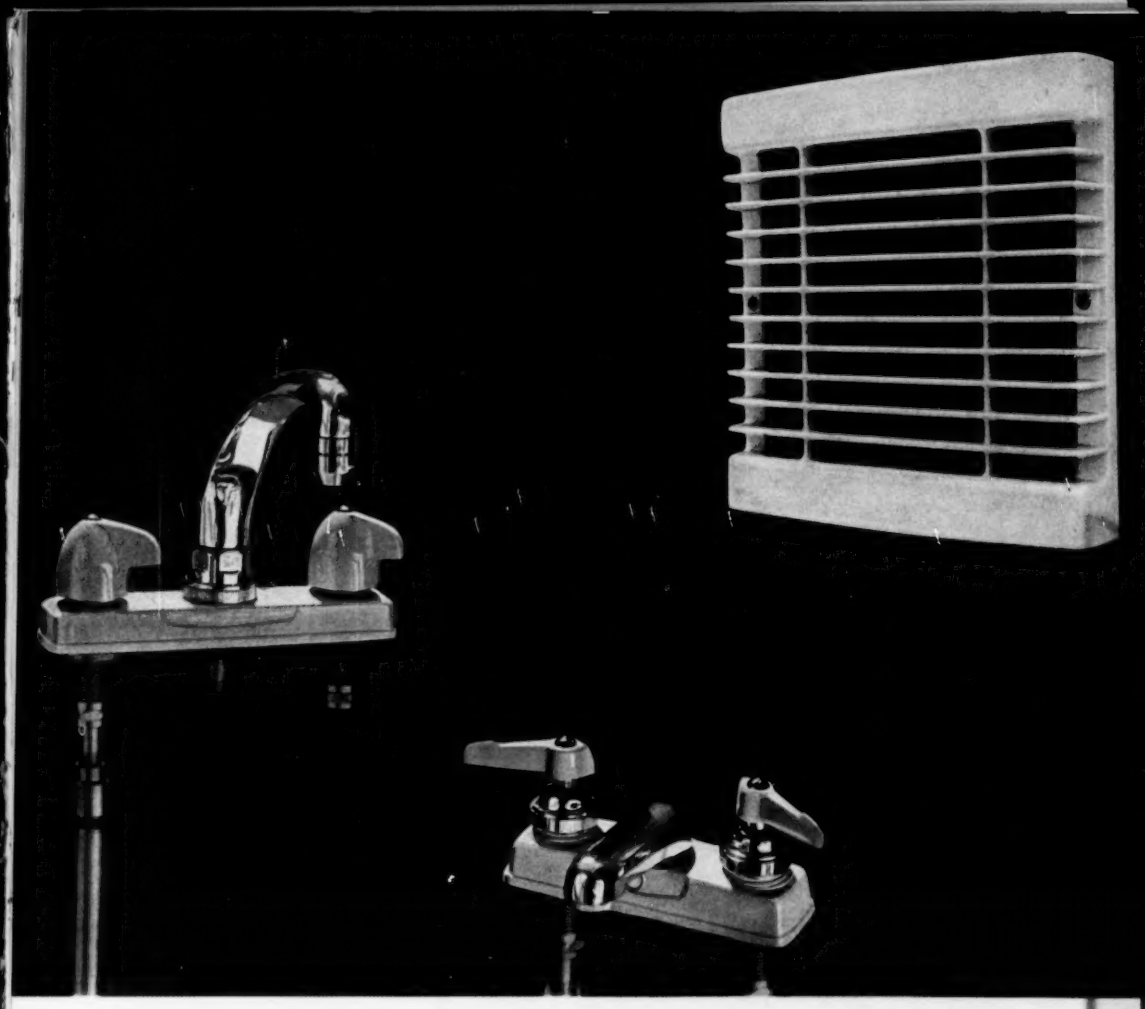
When the idea was still embryonic, Standard Oil realized that the reputation of the company would be riding on every tire equipped with a tiny red crown. Even if a valve cap has no effect on the quality of gasoline, customers are still going to be unhappy if the valve doesn't work properly . . . if the threads strip, if it fades, cracks or loses its shape.

To be sure they obtained favorable reaction, the oil company and the molder conducted extensive materials tests. The choice was BEETLE. Cyanamid's urea-formaldehyde molding compound. BEETLE'S unique properties—dimensional stability, hard, durable surface, resistance to heat, wear and abrasion (not to mention resistance to gas and oil)—plus the ingenuity of an experienced molder, resulted in an inexpensive promotional item that is as utilitarian as it is arresting.

Other manufacturers who must stake their reputations on such "expendable" items are turning to BEETLE more and more frequently. Plastics molders have turned BEETLE'S properties into closures for jars, tubes, cans, bottles and other containers that are not only more efficient in their functional tasks, but are sales builders as well. The unlimited range of colors and shades, smooth, pleasant-to-touch texture, resistance to chemicals, alcohol and essential oils, and the infinite variety of intricate shapes it can assume, have made BEETLE one of the most popular closure materials. And these same properties have enabled BEETLE buttons to keep their good looks despite the onslaughts of hot irons, strong bleaches, harsh soaps and cleaning fluids.

In the hands of a good thermosetting plastics molder, there's almost no limit to BEETLE'S possibilities. Their experience, facilities and ingenuity are opening new horizons for plastic products every day.

These men are available . . . so is BEETLE. Why not talk over your idea, or your problem, with the nearest molder today?



Ventilator grille molded for American Blower Company by General Electric Company, Ft. Wayne, Ind., and Michigan Molded Plastics, Dexter, Mich.

Escutcheons molded for Sears Roebuck and Company by Plastics Masters, Inc., New Buffalo, Mich.

build a plus for buildings

. . . with **BEETLE®** *molding compounds*

BEETLE (urea-formaldehyde) molding compound is putting more value into interior equipment on many a new construction job . . . because BEETLE offers:

+ Great freedom of design
+ Unlimited color range
+ Resistance to dirt . . . abrasion . . . organic solvents . . . water . . . heat
+ Dimensional stability
+ Adaptability to economical molding procedures

These same properties have made BEETLE a favorite material for appliance housings and handles, electrical parts, closures and a host of other products, too.

Yes . . . BEETLE is available! So drop us a line. We'll tell you more about this *value*-able material in terms of *your* product.

We may be able to help you meet military specifications where plastics and resins are concerned. What's your problem?

AMERICAN Cyanamid COMPANY

PLASTICS DEPARTMENT

32 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

In Canada: North American Cyanamid Limited, Royal Bank Building, Toronto, Ontario, Canada

of modified stripper plate construction, causes the molded nipples to be lifted off the cores as the die opens. The operator catches the shot as it falls free of the mold and degates the nipples by peeling them from the sprue like grapes from their stems. The nipples are gated from two sides at the outer edge and stem from four primary runners. After degating, the sprues are tossed into a drum to be later reground and fed back into machine. Molded pieces require no finishing operations.

It is possible that Auto-Lite may eventually use a dry elastomeric vinyl premix instead of molding granules for this job, but no arrangement has yet been made for a material changeover. Whether material in this form is available in commercial quantities will largely determine whether such a program is adopted. Due to its mulling action, the J-C machine can easily handle the dry type of premix material.

Zone Temperatures

In running the distributor nipple job, Auto-Lite maintains a temperature of about 245° F. on both heater zones of the pre-plasticizer and the same temperature on the injection chamber. A steam connection on the cavity maintains a temperature of 135° F. on the front half of the mold, while water is used to hold the temperature of the male die at 100° F. A pyrometer hookup provides a direct temperature reading on the front half of the mold. Temperature controls used on the preheater and the injection chamber are of the Electromax type, produced by Leeds & Northrup Co., Philadelphia, Pa.

Before being installed by Auto-Lite, the J-C machine turned out some test shots of elastomeric vinyl vacuum cleaner parts being used by The Hoover Co. On a molded hose grip produced in a 4-cavity die, a cycle of 45 sec. was obtained. This compares to a normal cycle of 2 min. on a conventional type of injection machine. Other materials were also molded with excellent results. One shot run experimentally was a rectangular radio dial crystal, made in a 4-cavity die. In producing this part, clear styrene molding material was first combined with red dry colorant and given a preliminary mix by rolling the drum of material along the floor. Due to the thorough mixing and compounding action of the pre-plasticizer, the molded parts showed excellent and uniform dispersion of the red color.

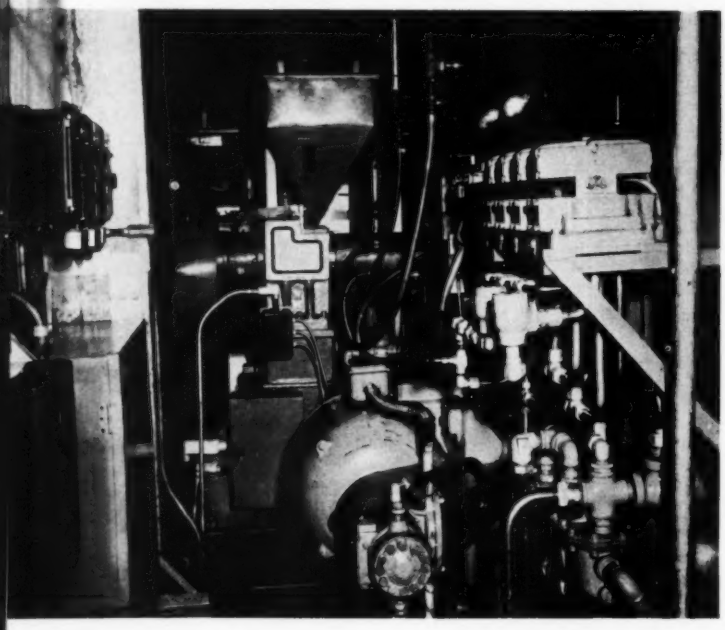
Capacity

The J-C 16-oz. machine plasticizes 180 lb. of styrene per hour, and the rating on the machine is 16 oz. of polystyrene.

Pumps used on the machine were supplied by Vickers, Inc., Detroit, Mich., and are used in conjunction with hydraulic valves from the same manufacturer. On this 16-oz. machine, the large volume pump is of 21 gal. capacity and the small volume pump is a 3 gal. unit. The two timers which regulate the overall time cycle and the injection cycle are made by Eagle Signal Corp., Moline, Ill. The hydraulic system is equipped with a Harrison oil cooler. Pump motor is of 30 hp. rating. Platen size of the 16-oz. machine is 29-in. square. The screw of the pre-plasticizer unit is of stainless steel with Stellite lands. Tool steel, flash chromed, is used on extruder housing, Stellite on ram and chamber.

The complete screw and drive assembly of the machine is attached by six easily accessible bolts. The injection ram and cylinder can be reached by removing six bolts and two pipe connections. The stationary platen is operated by hydraulic cylinder for ready access to the injection chamber and nozzle. With the nozzle and ram removed, the injection chamber can readily be cleaned. Hydraulic pumps, valves, and pipe lines are open and accessible. Manhole covers enclose the sump and the surge valve mounted inside the tank.

The screw-powered pre-plasticizer assembly is to be made available as a conversion unit for application to other types of molding machines. The effect of such installations would be to shorten molding cycles, provide improved strain-free parts, and enable the machine to be used for dry coloring or for running pre-blends. In adapting the unit to a conventional horizontal injection machine, the regular injection chamber would be removed and replaced with a new chamber of the type used in conjunction with J-C pre-plasticizer assembly.



Material is fed directly from hopper to pre-plasticizer unit; frictional heat produced by extruding screw augments that from the heaters to insure complete pre-plasticization

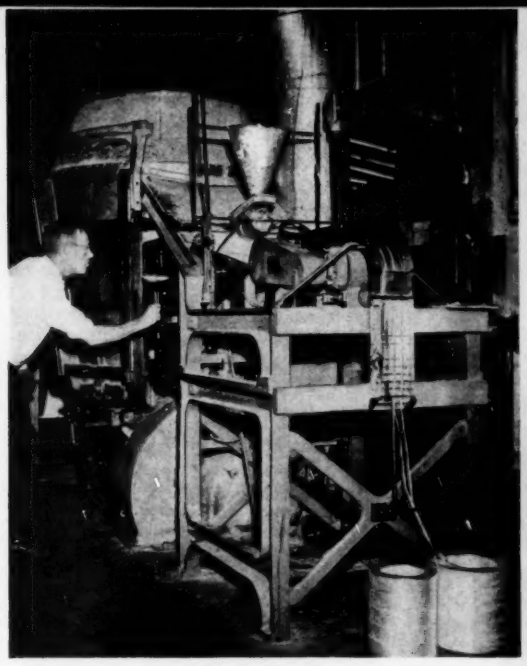


Fig. 1—Fiberglas yarn (lower right) is drawn from coils into chopper, cut into 2-in. fiber lengths, and sucked into preform chamber (left)

Fig. 2—Forming molds are placed over vacuum exhaust ports on turntable in preform chamber; exhaust fan draws fibers to molds

Lighter than Steel

Reinforced plastic dust bowl for vacuum cleaner will compete price-wise with metal when surface-finish problems are solved

STRINGENT Government controls of most metals have been the direct cause for the redesign of hundreds of products to take advantage of the many excellent properties of plastics. The same thing happened during World War II but, to the sorrow of the plastics industry, so many applications were so poorly redesigned, or not redesigned at all, that many failures resulted. The lessons were expensive, learned the hard way, but are now paying off.

Most major metal-to-plastics change-overs today are being realistically re-engineered so that the new plastic parts can be manufactured efficiently and will function properly in their designed use.

One such experience was detailed on p. 103 of the October 1951 issue of MODERN PLASTICS. Here it was shown how and why 16 parts of the Lewyt vacuum cleaner, formerly made of steel, aluminum, zinc, or rubber, have been changed to plastics. Some parts cost more money—some less—but in every case the plastic replacement is doing an equal or better job.

The largest of the redesigned parts—the dust bowl for the cleaner—is now being made of polyester resin reinforced with fibrous glass. The plastic part costs more than when made in metal, but it is 75% lighter, which is an important factor in this type of vacuum cleaner.

Preform Machine

Looming large in the success of producing this dust bowl is a preform machine developed by Turner Machine Co., Inc., Danbury, Conn. This machine is composed of two main parts. One is a special variable speed cutter which chops Fiberglas yarn or rovings into exact lengths, the length being determined by the requirements of the piece to be pro-

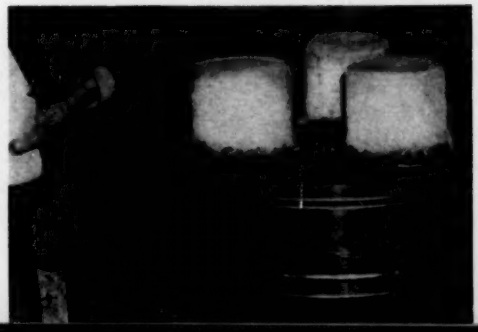


Fig. 3—After preforms have been made, each is sprayed with 2 to 5% by weight of a Plaskon resin emulsion while still on the rotating turntable

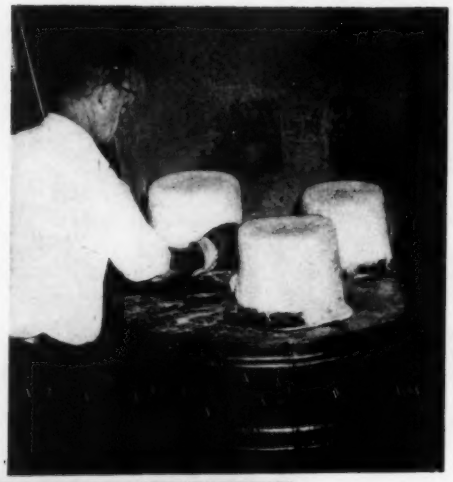


Fig. 4—Preforms are taken from plenum chamber and placed in recirculating oven where air at 300 to 350° F. is pulled through to reduce bulk and cure the binder

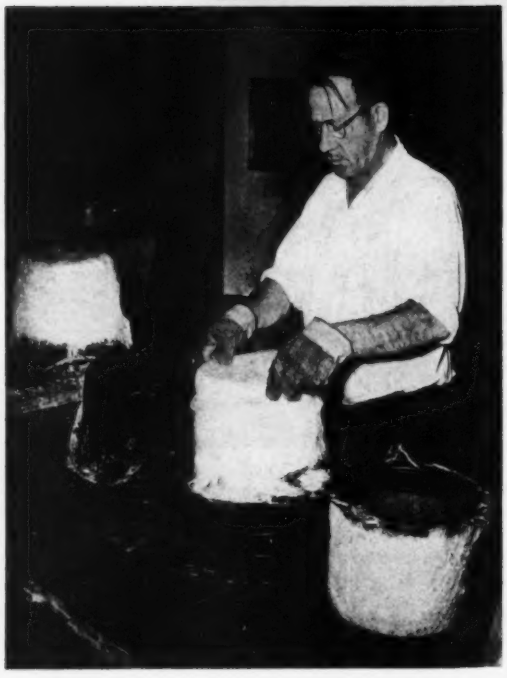


Fig. 5—Operator removes the preform from the forming mold preparatory to performing the molding operations

duced. The second is a plenum chamber to which the chopped lengths are fed. This plenum chamber is an enclosed conical unit with two access doors in its side and a tiltable turntable in its base. This turntable is equipped to hold one or more preform screens, as demanded by the job in hand. For the Lewyt project, three screens are used.

This preform machine is designed so that the chopped yarn or rovings are drawn into the plenum chamber by the action of a suction fan. If desired, a powdered resin may be fed automatically into the air stream. In the case of the Lewyt dust bowl, however, the molder, Auburn Button Works, Inc., Auburn, N.Y., decided to produce an un-impregnated preform.

Figure 1 illustrates the general setup, with lengths of Fiberglas yarn being drawn from coils into the chopper. The plenum chamber is in the background. Three forming molds, made of 16-gage steel with ⅛-in. diameter holes spaced to provide 40% open area, are placed over vacuum exhaust ports on the turntable, as shown in Fig. 2. After the access doors have been closed, an automatic timer which controls both the suction fan and the chopper is set for 45 sec., and the speed of the chopper is set so that the fibers run through it at a rate of about 2 lb. per minute. At the end of the 45-sec. cycle, the machine is automatically stopped. The access doors are then opened and each preform is sprayed with 2 to 5% by weight of a Plaskon resin bonding emulsion while the preforms and forming molds are still in place. This operation is simplified by rotating the turntable during spraying (Fig. 3).

The preforms, still on the forming molds, are then removed from the plenum chamber (Fig. 4) and

Fig. 6—Preform is carefully weighed to check whether correct amount of glass fibers has been deposited

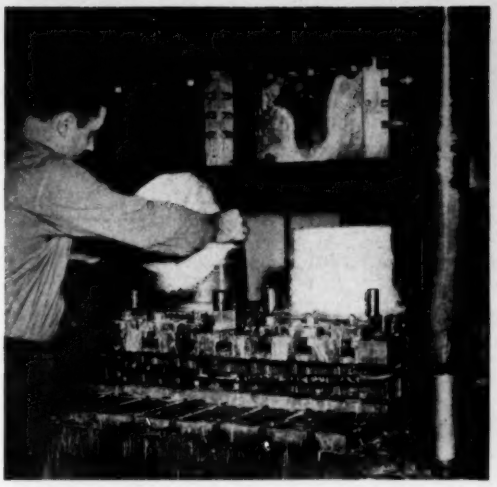


Fig. 7—Placing preforms on force plugs of two-cavity mold; both the plugs and the cavities of the mold are cored for circulating steam

Fig. 8—Charge of liquid resin being poured from a container onto the top of the preform; the mold is then closed for required cure time

are placed in a re-circulating Lanly drying oven, especially designed to Auburn Button Works' specifications. This oven is equipped with three vacuum ports, over which the preforms and their forming molds are placed. The suction blower with which this oven is equipped is then turned on, and heated air is drawn through the glass fibers to set up the bonding emulsion so that the preform will hold its shape after it is removed from the forming mold. This latter operation requires only a 45-sec. cycle. Figure 5 shows the operator removing a preform from the forming mold, after which it is accurately weighed to be sure that the correct amount of glass fibers have been deposited (Fig. 6).

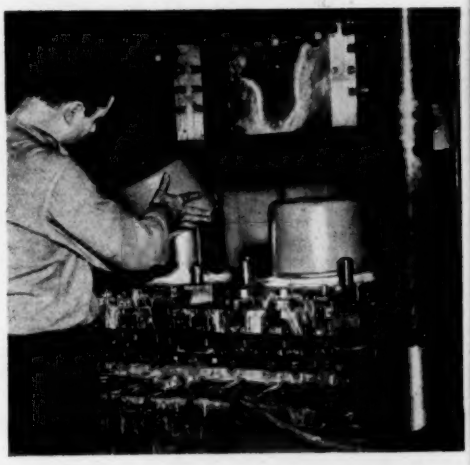


Fig. 9—Operator removes the molded part from the force plugs after they have been partially ejected by air

Steel Molds Used

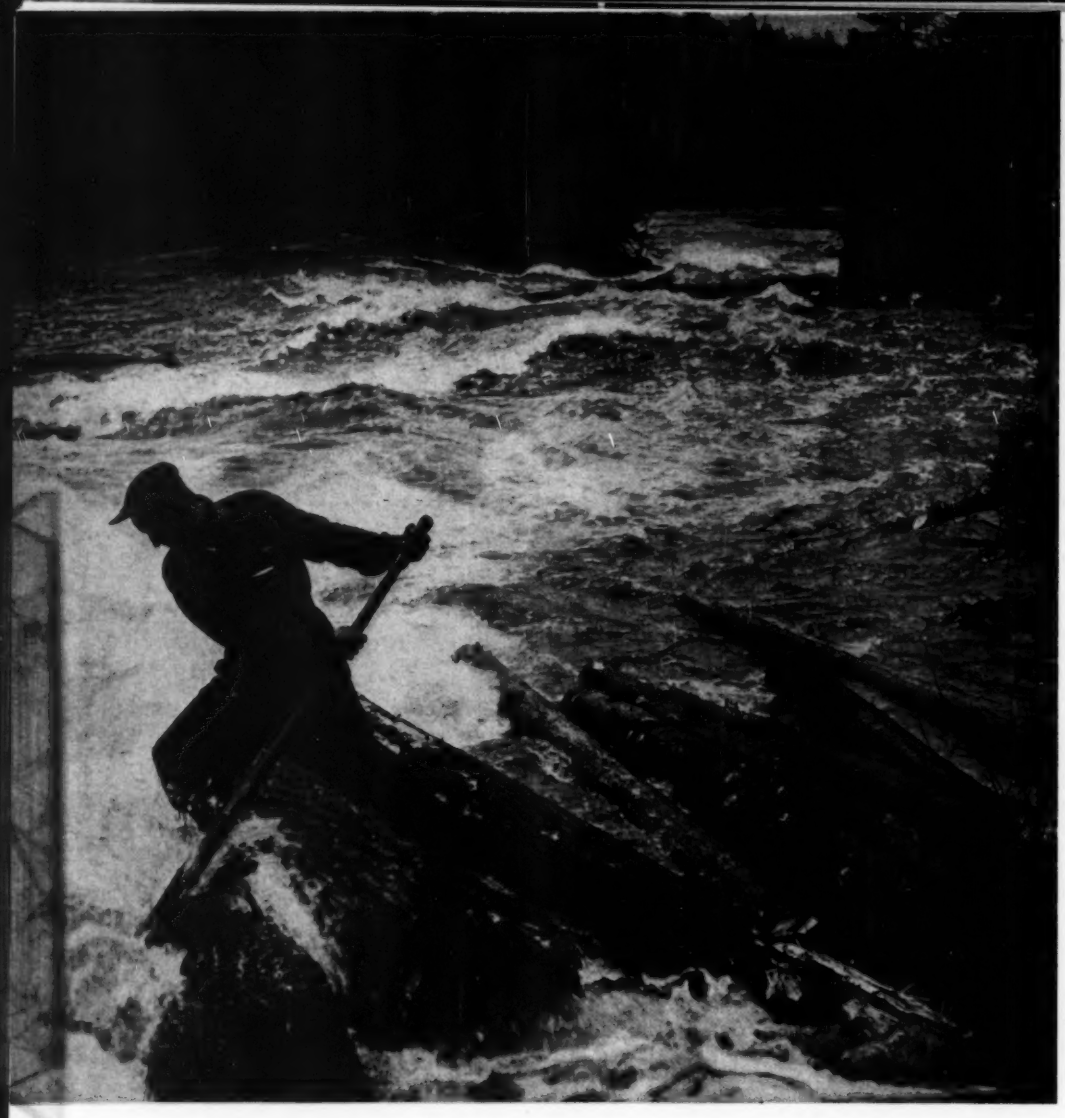
Although cast aluminum matched molds are frequently used in this type of molding, Auburn decided that the production requirements on the Lewyt job made it mandatory to produce steel molds which would definitely stand up over a long run. Both the force plugs and cavities of this two-cavity mold (Fig. 7) are cored for circulating steam, and they are operated at a temperature between 230 and 260° F.

After the preforms have been removed from the forming molds, they are slipped over the force plugs (Fig. 7), and a measured quantity of Pittsburgh Plate Glass Co.'s Selectron resin is poured from a container onto the top of the preform (Fig. 8). The mold is then closed for the required cure time and the design of the mold causes the resin to flow uniformly into and impregnate the preform. A pressure of approximately 100 p.s.i. on the molding area produces a smooth and uniform finish. In Fig. 9 the operator is taking the molded parts off the force plugs after they have been partially ejected by air.

It is then necessary to punch one large side hole and eight small attachment holes in the walls of the molded bowl. This is done in one operation with a side-draw die.

No further operations are performed by the molder; however, a special baked-on finish is applied to the bowl by Lewyt.

At the moment, the only reason why Lewyt is not convinced that this polyester-glass bowl will permanently replace the steel bowl when steel is once more readily available, is that the price of the finished plastic bowl is considerably higher. In an effort to change this price differential, Auburn is endeavoring to produce a molded finish which will be satisfactory to Lewyt and which will eliminate the costly painting operation. This, according to an executive of Auburn, should bring the total price of the plastic bowl within the range of the steel bowl. When this problem is solved, a plastic which has already proved its over-all superiority will also find another place for itself in the picture of industrial economy.



WHEN NEEDED . . . a specialist!

No machine has ever been invented to take over this job. Here, a man is needed—a specialist.

Many a fine product, too, misses success because *the* man was missing—*the* specialist. At Marblette you'll find one of America's most brilliant group of specialists in plastics. And around these men, in the last 22 years, Marblette has built up the special equipment specialists must have. In no other way would it have become possible to give you the special formulation in each liquid phenolic resin necessary to meet *your* special production requirements . . . and to meet also the special functional needs of *your* product and to solve *your* special marketing problems.

Marblette's liquid phenolic resins are the thermo-setting plastics which can be set either by heat or at room temperature. Among other properties, they are weather-proof, solvent-proof, fungi-proof; resistant to abrasion, heat and temperature.

Let Marblette's experience over the last quarter of a century help you in solving *your* liquid phenolic resin needs —whether it be in drums or tank car quantities. Our plant and offices are strategically located to serve you promptly anywhere in the United States. Write "Marblette Engineering" to analyze and prepare samples for you of the one phenolic resin best suited to *your* special needs.

MARBLETTE

37-21 30th St. • Long Island City, New York • ST 4-8100
CHICAGO • LOS ANGELES • TORONTO • HAVANA

liquid phenolic resins

Casting resins for dies and tools • Heat and acid resistant resins • Bonding resins • Metal coating • Insulating varnish
Bristle setting cement • Laminating varnish • Wood coating • Plastic cements • Sealing resins • Resin foundry core binders

Low Temperature Behavior of Plastics†

by H. K. NASON††, T. S. CARSWELL†††, and C.H. ADAMS**

When exposed to low temperatures, organic plastics undergo changes which may be classified broadly as reversible and irreversible. Reversible effects usually include dimensional changes due to thermal contraction and loss of moisture, increased modulus of elasticity, increased yield and ultimate strengths, decreased ductility, and—most frequently, though not in every case—decreased resistance to impact. Irreversible effects may include dimensional changes due to change of state, physical failure due to lack of sufficient ductility to respond to dimensional changes, crystallization, and freezing of plasticizers or absorbed water. In either classification, extent and rapidity of every effect varies greatly, depending upon specific environmental conditions and the particular material involved.

Data are presented to illustrate these various effects. Significance from a practical point of view is shown by typical examples. Also, the importance of correct design of parts is emphasized. The paucity of data at low temperatures for such properties as fatigue strength, stress endurance, and electrical constants is pointed out.

PLASTICS and other engineering materials were, for many years, incorporated into equipment design largely upon the basis of a limited empirical knowledge of the materials' behavior at the temperatures encountered in the normal useful life of the finished part. That such knowledge included almost nothing relative to behavior at low temperatures constituted little of a handicap, since only rarely was equipment expected to operate under such conditions. But as our civilization grew more technologically complicated, this situation changed. Automobiles were expected to function satisfactorily throughout the year, no longer spending the winter on blocks in the garage, protected from the cold and snow. Communications equipment, likewise, was required to operate under all types of adverse conditions. Design of this type of equipment stressed proper functioning under such conditions, for the value of a communications system was and is measured by its performance during emergencies. High altitude flying has further stimulated investigation of low temperature behavior of plastics and other engineering materials, for it has introduced as important, the atmospheric conditions of the stratosphere, with its intense, dry cold (-80° F.) which is to be encountered but an hour or less from any spot on earth. World War II did much to accelerate progress in the designing of equipment which would operate reliably at low temperatures and the obtaining of data on properties of engineering materials under such conditions. Military planning continues to emphasize the importance of gaining a more complete knowledge of the physical properties of plastics and other materials of engineering at low temperatures.

Exposure to low temperatures produces changes in the properties of plastic materials which may be temporary (reversible) or permanent (irreversible). Typical of the former are dimensional changes, changes in strength characteristics, changes in electrical properties, and changes in basic physical constants. Permanent changes include crystallization, crazing, cracking, and warping or buckling. Whether or not such permanent damage occurs may be influenced largely by the design of the component and by the manner of fabrication.

Dimensional Changes

Dimensional changes in plastics exposed to low temperatures may be due only to thermal contraction. But in many cases shrinkage due to loss of moisture content may occur. Organic plastics generally show larger changes in dimensions with changes in temperature (Fig. 1) than do the majority of the materials of engineering. This may lead to little or no difficulty when the object is of plastic throughout. However, combinations of plastics with metals must be properly engineered to compensate for the differences in thermal contraction properties of the two materials. The thermal coeffi-

---

* Reg. U.S. Pat. Office.

† Paper presented as part of a "Symposium on Effects of Low Temperatures on Materials" in Philadelphia, Pa., and published here through the courtesy of the American Society for Testing Materials.

†† Central Research Department, Monsanto Chemical Co., Dayton, Ohio.

††† Present address: Commercial Solvents Corp., Terre Haute, Ind.

** Plastics Division, Monsanto Chemical Co., Springfield, Mass.

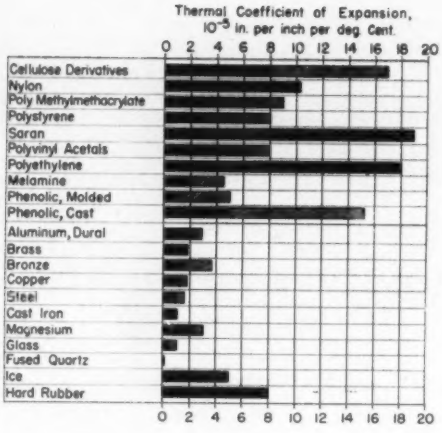


Fig. 1—Thermal expansion coefficients of some engineering materials

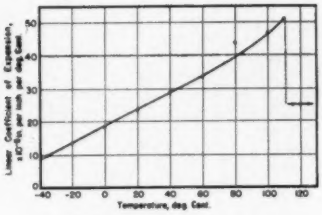


Fig. 2—Variation with temperature of thermal expansion coefficient for polyethylene (18)

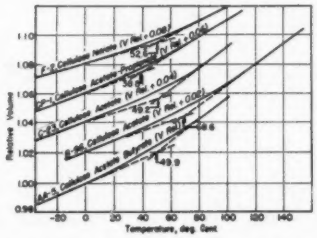
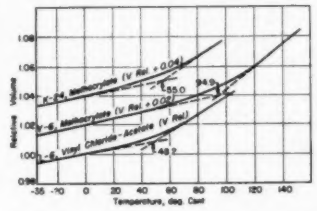


Fig. 3 (above)—Temperature-volume relationships for several thermoplastics

Fig. 4 (below)—Temperature-volume relationships for other thermoplastics



cient of contraction of a plastic may provide an index of the precision that can be attained in molded parts; that is, the lower the mold shrinkage due to thermal contraction, the sharper the mold impression.

The linear shrinkage of a number of plastic sheets due to thermal contraction is illustrated by examples in Table I. Similar data for molded plastics are presented in Table II. It will be noted that among the thermoplastic materials polystyrene possesses a very low coefficient of thermal contraction. This property, together with excellent dimensional stability, makes this polymer particularly well suited to low temperature applications. Polymethyl methacrylate behaves nearly as well. The thermosetting compounds have coefficients approximating those for metals, which accounts for the numerous satisfactory applications of these materials in combination with metals.

The relationship between temperature and linear coefficient of expansion for polyethylene resin (18)[1] is shown in Fig. 2. The discontinuity observed at approximately 110° C. is due to a first order thermodynamic transition from the crystalline to the amorphous state. Relative volume as a function of temperature is shown for several thermoplastic materials in the curves of Figs. 3 and 4 (39). Of particular interest here are the apparent second order transition temperatures obtained by extrapolation of the linear portions of the curves to the point of intersection. The word "apparent" is here prefixed to indicate that this is not a true thermodynamic phenomenon (26). For the materials shown, this temperature is not in the range of low temperatures under consideration in this presentation. However, it does assume primary importance for certain materials which undergo this type of phase transition at lower temperatures. This will be recognized when it is pointed out that polymeric materials behave as rigid substances below this transition and as rubber-like materials above. Other physical properties than volume can be measured as a function of temperature to establish this point.

In any discussion of the low temperature behavior of plastic materials, the importance of equilibrium moisture content must not be overlooked. It is recognized that moisture acts as a plasticizer for many materials, the degree of plasticization depending upon the chemical nature of the plastic. Thus, the cellulosics exhibit equilibrium moisture contents considerably higher than the phenolics. The relationship between relative humidity and moisture content at 25° C. for cellulose nitrate sheet is shown in Fig. 5 (13). The variation in brittleness characteristics (27) for cellulose acetate sheet as a function of relative humidity

[1] The numbers in parentheses refer to the list of references on p. 201.

Table I.—Linear Shrinkage of Plastic Sheet Due to Thermal Contraction

Material	*Thermal coefficient*	*Linear shrinkage from 50° C. to −40° C.*		
	10^{-5} in./in.	*in./in.*	*%*	*in./20-in. plate*
Cellulose acetate	15.6	0.014	1.4	0.280
Polymethyl methacrylate	8.0	0.0072	0.72	0.144
Polystyrene	7.5	0.0068	0.68	0.135

Table II.—Linear Shrinkage of Molded Plastics Due to Thermal Contraction

Material	*Thermal coefficient*	*Linear shrinkage, from 50° C. to −40° C.*	
	10^{-5} in./in.	*in./in.*	*%*
Cellulose acetate	14.2	0.0128	1.28
Polystyrene	7.5	0.0068	0.68
Nylon	10.3	0.0093	0.93
Polyethylene	18.0	0.0162	1.62
Polyvinylidene chloride	19.0	0.0171	1.71
Polyvinyl formal	7.7	0.0069	0.69
Melamine	2.7	0.0024	0.24
Phenolic	3.1	0.0028	0.28

miles of TENITE

tubing are now in service in the oil fields as noncorrodible pipeline for sour crude oil and salt water. The smooth-walled Tenite tubing weighs only a fraction as much as steel pipe and requires no special equipment to install – one man can easily shoulder two 20-foot lengths. Slip-sleeve and molded Tenite couplings assemble the lengths speedily and permanently. Tough Tenite pipe has high impact strength, weathers well, is flexible enough to follow earth contour and to withstand expansion caused by ice formation. It is unharmed by normal soil conditions and backfilling operations.

Long successful in both outdoor and indoor applications, Tenite is also effectively used for irrigation tubing, traffic markers and a great variety of sporting and household goods.

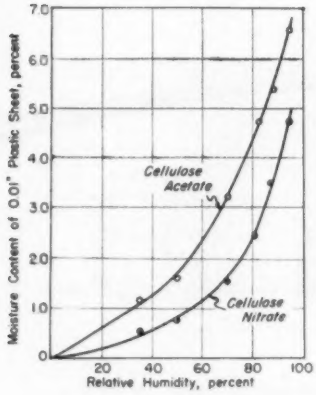
For further information about Tenite, write Tennessee Eastman Company, Division of Eastman Kodak Company, Kingsport, Tennessee.

• *Oil field tubing extruded by Carlon Products Corporation, Cleveland, Ohio, and distributed by Green Contracting and Engineering Company, Wichita, Kansas.*

TENITE

an Eastman plastic

Information regarding Tenite is also obtainable through representatives located in Chicago, Cleveland, Dayton, Detroit, Leominster, Mass., Los Angeles, New York, Portland (Ore.), Rochester, N. Y., St. Louis, San Francisco, and Seattle, and elsewhere throughout the world from Eastman Kodak Company affiliates and distributors.



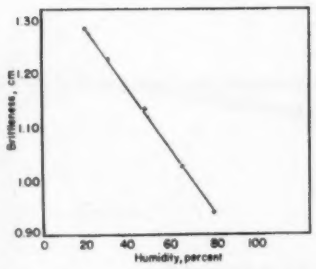


Fig. 5 (left)—Effect of ambient humidity on water content of cellulose acetate and nitrate sheets. Fig. 6 (above)—Effect of humidity on brittleness of cellulose acetate sheeting, 0.010-in. thickness

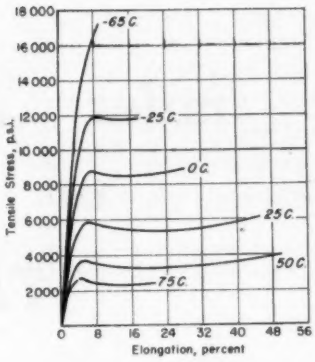


Fig. 7—Stress-strain curves for cellulose nitrate sheet (0.125-in. sheet, 0.2 in. per min. 0 percent relative humidity)

is plotted in Fig. 6. In general, the equilibrium moisture content for organic plastics shows a tendency to decrease as the temperature is lowered. This decrease in equilibrium moisture content is reflected in a decrease in the toughness of the material, an important factor in design considerations for low-temperature applications. Dimensional changes with changing moisture content may be appreciable even for thermosetting plastics, as is shown by the data in Table III (28).

Table III.—Changes in Phenolic Laminates Between Wet and Dry Conditions

Laminate fabric	Weight loss	Dimensional changes		
		Length	Width	Thickness
	%	%	%	%
Cotton	5.3	0.35	0.6	1.3
Asbestos	3.2	0.15	0.2	0.7
Glass	1.8	0.12	0.2	0.7

Strength Characteristics

The relationship of the mechanical properties of plastics with temperature has been the subject of many investigations. Much of this work has been summarized by Carswell and Nason (6). One of the most useful tools of the physicist and engineer in the evaluation and application of plastic materials is the stress-strain curve. The characteristics of the curves obtained enable one to classify plastics into a few well-defined groups. It is important to note that such a classification must be based on data obtained at some reference temperature and humidity. This is well illustrated by the curves appearing in Figs. 7 (13) and 8 (29). A comparison of the stress-strain curves at 25° C. for cellulose nitrate and polystyrene shows that the nitrate can be classified as a soft-tough plastic and the polystyrene as hard-brittle. If, however, the trend with temperature is investigated, it will be noted that the cellulose nitrate behaves as a soft-weak material at 75° C., a soft-tough material at 25° C., and as a hard-brittle material at -65° C. While these classifications are necessarily broad, it is important to note that polystyrene behaves in a similar fashion but at a higher range of temperatures.

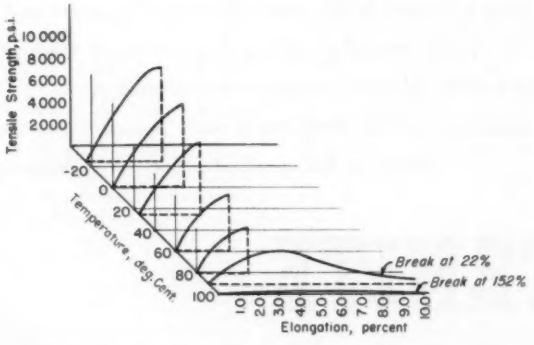


Fig. 8—Stress-strain curves for injection-molded polystyrene

Stress-Strain Relationships

Consideration will now be given to the effect of lowering the temperature on the various portions of the stress-strain curve. The first of these, elastic modulus, is derived from the linear portion of the stress-strain curve and it is a measure of the stiffness or flexibility of the material. Tensile, flexural, and compressive moduli for cellulose nitrate sheet show a marked increase with decreasing temperature (Fig. 9) (13). Other plastics exhibit similar behavior.

Next in line on the stress-strain curve is the yield point, a value which is probably more indicative of the useful strength of a ductile plastic than the ultimate strength. The effect of lowering the temperature of the yield stress value for cellulose acetate sheet is shown in Fig. 10 (13). Similar data for various cellulose acetate molding powder formulations are given in Fig. 11 (6, 38). These data seem to indicate that below 0° C. the yield stress increases at a slower rate or even

(Continued on p. 134)

MOSINEE

"More than Paper"

MOSINEE offers the plastics industry dependably uniform paper-base processing materials with scientifically controlled chemical and physical properties . . . high tensile and tear strength with high absorptive capacity . . . or other properties, with *dependable uniformity.*

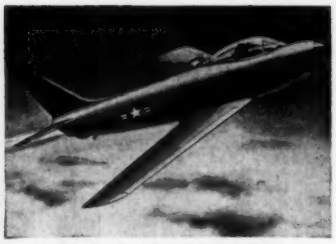
MOSINEE can give you technical characteristics engineered to meet your specific plastics production requirements. If you have a problem involving paper, write Dept. MP.

MOSINEE PAPER MILLS COMPANY • MOSINEE, WIS.

Essential Paper Manufacturers

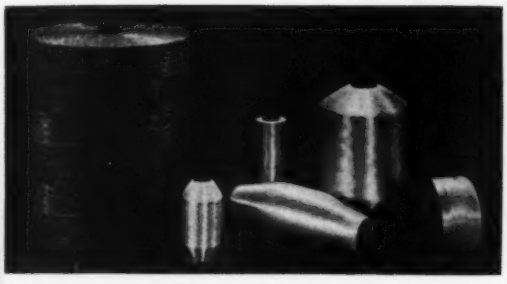
Automobile tops, insulated with L·O·F Fiber·Glass against heat and cold, increase passenger comfort. Easy installation. Light weight. Won't deteriorate under normal conditions.

Automobile sound insulation a made-to-order job for L·O·F Fiber·Glass. Easy installation in doors, under the dash, on the fire wall, under the hood. Low moisture absorption, light weight.

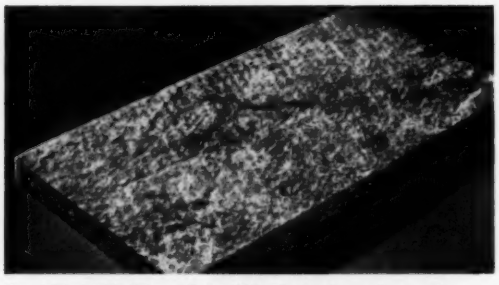


Aircraft sound and thermal insulation. Get these advantages of L·O·F Fiber·Glass. Light weight (as low as .3 lb. per cu. ft.). High fire safety. Low moisture pickup. High sound-insulating efficiency.

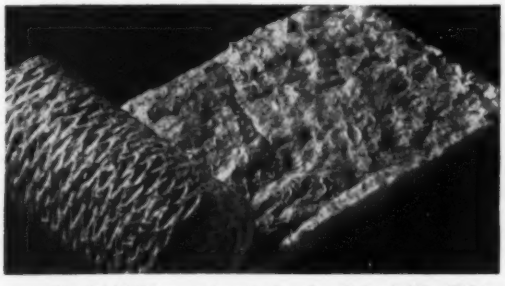
Proven glass technology plus now devoted to early production



Continuous Fiber Textile Yarn—150 series for many uses, such as electrical insulating tape, sleeving, cloth, roving, and paper reinforcement. Glass fibers have enormous tensile strength . . . 250 thousand pounds per square inch. High dielectric strength. Withstands temperatures up to 800°F.

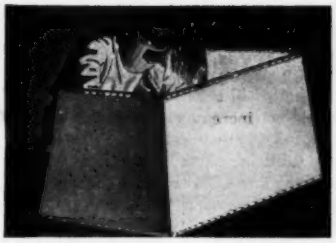


Super·Fine "B" Fiber—Splendid thermal- and sound-insulating qualities. Fiber diameter, .00012". Temperature range –0°F. to plus 450°F. Standard roll widths, 18", 24", 36", 72", in 100' and 200' lengths. Other widths and lengths also available in a range of thicknesses and densities.

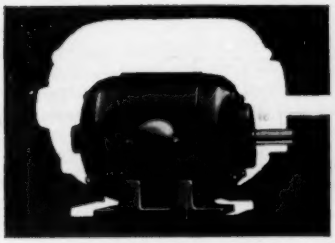


Super·Fine "AA" Fiber—primarily for aircraft insulation. Thickness, .5" with density of .6 lb. per cu. ft. Fibers of incredibly small diameter—.00004". With plastic binder to hold dimensional form. Roll widths, 36", 72", in 50' standard length.

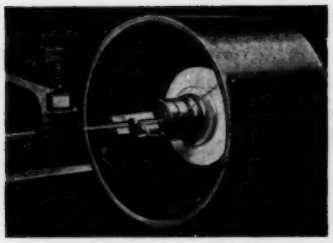
Roving, Chopped Strand and Textile Yarns—for reinforcing of plastics, paper, cloth and paper tape, etc. Enormous tensile strength. Won't shrink or stretch. Won't deteriorate under normal conditions. Versatile in application.



Industrial fabrics woven from Fiber·Glass are fine, safe, strong, rot- and mildew-proof. Ideal applications are tarpaulins, flame shields, airplane cloth, reinforcement for plastics.



Electric motors and generators insulated with L·O·F Fiber·Glass withstand heavy overloads. Appreciable space factor advantages! High dielectric strength.



Wire and cable can be served directly with L·O·F Fiber·Glass textile yarns using standard machines. Yarn also ideal for weaving tape, and braiding on wire and into sleeving.

fine, new facilities of L·O·F FIBER·GLASS!

Aviation, automotive, textile and electrical industries first to benefit from new, high-quality source of supply being readied by Libbey•Owens•Ford

HERE IS headline news of *immediate* interest to key men of business and industry.

The resources and advanced technical glass knowledge of Libbey·Owens·Ford are being focused on a new product—L·O·F Fiber·Glass!

With fine, new facilities at Parkersburg, W. Va., placed to serve you quickly, glass technicians of proven ability and experience are getting set to produce top-quality Fiber·Glass products in volume. (See facing page for basic items to be produced. Note above and right for typical applications.)

Across the country, in 24 major cities, L·O·F offices are busy with preparations to give you help on specific uses.

If your company has already discovered the superior qualities of fibrous glass, investigate L·O·F now as a new volume source, worthy of your complete confidence.

If your company now buys other material for electrical insulation, thermal or acoustical insulation, or reinforcing for plastics or paper, L·O·F Fiber·Glass can offer a combination of advantages unmatched by such other materials. This is a chance to benefit from the glass technology and the high standard of quality which you have come to expect from L·O·F!

For technical data, or engineering consultation on Fiber·Glass uses in your business, call your local L·O·F office—or write, wire or phone Libbey·Owens·Ford, Dept. F·G 107, Nicholas Bldg., Toledo 3, Ohio.

Plastic reinforcing, as in this bread tote tray, presents many possibilities with L·O·F Fiber·Glass. Remarkable strength. Won't dent or lose shape. No discoloration of plastic material. Exceptionally long life.

Paper and paper tape reinforced with L·O·F Fiber·Glass can be raised in tensile strength to equal aluminum or even steel! Either Fiber·Glass textile yarns or scrim mesh are suitable. Investigate!

LIBBEY·OWENS·FORD GLASS COMPANY

FIBER·GLASS DIVISION

L O F FIBER·GLASS

FIBER·GLASS

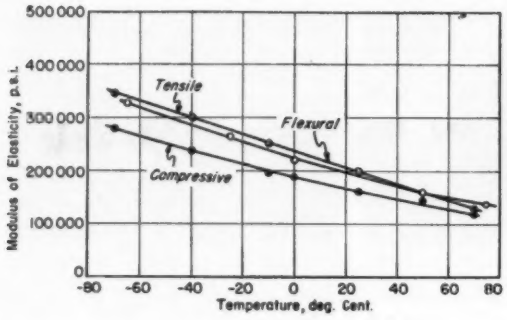


Fig. 9—Effect of temperature on modulus of elasticity of cellulose nitrate sheet (0.125-in. sheet, 0.2 in. per min. 0 percent relative humidity)

decreases; the effect may be due to decreasing ductility and increasing brittleness at these lower temperatures.

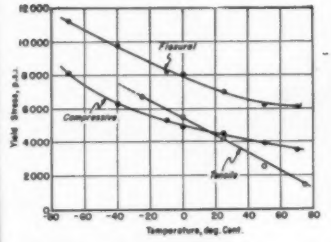


Fig. 10—Effect of temperature on yield stress of cellulose acetate sheet (0.125-in. sheet, 0.2 in. per min. 0 percent relative humidity)

The less ductile materials, such as polystyrene, polymethyl methacrylate (unplasticized) and the phenolics, usually fail before a yield point is reached. Hence, for these materials the third point on the stress-strain curve is of importance, namely, ultimate strength. Lowering the temperature gives rise to an increase in ultimate strength for essentially all polymeric materials. Reference to Fig. 12 (13) and Fig. 13 (6) shows this to be the case. The ultimate strength values for thermosetting compounds are generally less affected by lowering the temperature than are those for thermoplastic materials.

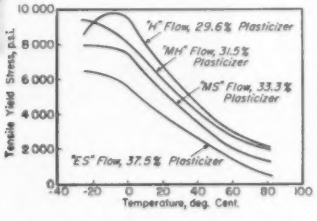


Fig. 11—Effect of temperature on yield stress of molded cellulose acetate

The effect of relative humidity on ultimate strength and elongation at failure is shown in Fig. 14 (13) for cellulose acetate and nitrate sheet stock. These data are presented here to emphasize that temperature alone is not responsible for the effects observed. This, of course, is particularly true for the cellulosics and other moisture sensitive plastics.

Plastics are not unique in their sensitivity to environment. Materials of construction, whether organic or inorganic, synthetic or natural, show similar behavior under changing environmental conditions. Thus, in Fig. 15 it will be noted that the ultimate strength for steel increases rapidly as the temperature is lowered, until a phase transition is reached, and slowly thereafter. Elongation behavior is inverse to that of strength.

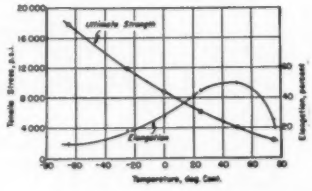
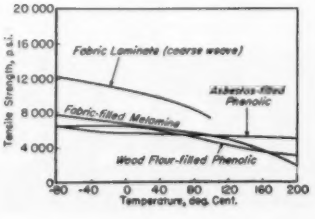


Fig. 12 (above)—Effect of temperature on tensile strength and ultimate elongation of cellulose nitrate sheet (0.125-in. sheet, 0.2 in. per min. 0 percent relative humidity). Fig. 13 (below)—Effect of temperature on tensile strength of several thermosetting plastics



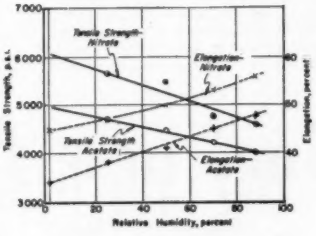
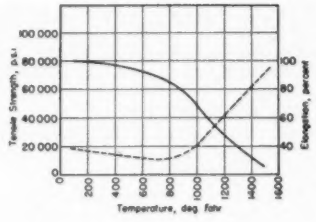


Fig. 14 (above)—Effect of relative humidity on tensile strength and elongation of cellulose acetate sheet (0.125-in. sheet, 25° C.). Fig. 15 (below)—Effect of temperature on tensile properties of steel



Compressive and flexural ultimate strengths for several plastic materials as related to temperature are given in Figs. 16 and 17 (6). The effect of temperature on shear strength is shown in Fig. 18 (13) and Fig. 19 (6).

From pure strength considerations, it would seem at first that the designer need not be concerned about the suitability of plastics for low-temperature applications in that the strength increases as the temperature is lowered. The foregoing would certainly be the case if shock or impact loading were not so frequently encountered. Consequently, the properties of a plastic material which determine its toughness are of utmost importance. In general, the area under the stress-strain

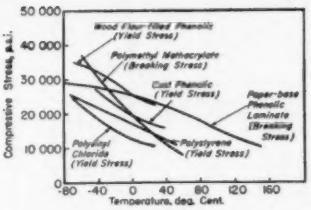
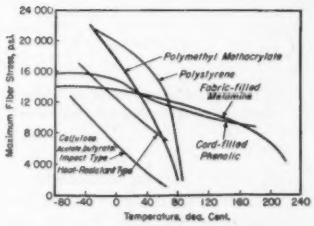


Fig. 16 (above)—Effect of temperature on the compressive strengths of several plastics. Fig. 17 (below)—Effect of temperature on the flexural strength of several plastics



curve is a measure of the toughness of a plastic material. This may be carried one step further and elongation or deflection used in even a more qualitative manner to estimate this property. The curves of Fig. 20 (6), which relate ultimate elongation to temperature, show that at 0° C. nylon might be expected to exhibit a higher order of toughness than polystyrene.

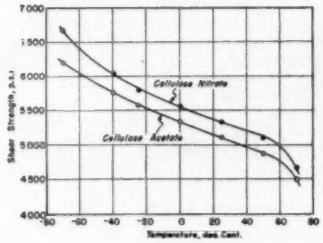
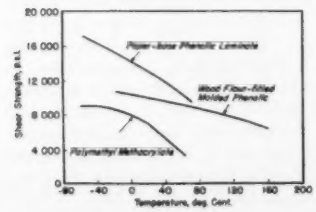


Fig. 18 (above)—Effect of temperature on shear strength of cellulose acetate and nitrate sheets. Fig. 19 (below)—Effect of ambient temperature on shear strength of some plastics



The Izod impact test currently is the most widely used method for evaluating the toughness of plastic materials. From a theoretical standpoint, the method is subject to several errors (36). However, it does provide useful, practical, albeit highly qualitative, information. The effect of temperature on the Izod impact strength of a number of thermoplastic materials is shown in Figs. 21 and 22 (6). It is interesting to note that the impact strengths of polystyrene and polymethyl methacrylate are but little affected by lowering the temperature. Impact strength versus temperature curves for thermosetting materials are given in Fig. 23 (6).

The effect of moisture content on the impact strength of cellulose acetate molding compounds of varying plasticizer content is shown in Fig. 24 (6). It has been pointed out that

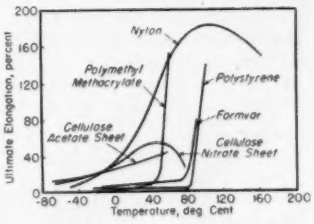


Fig. 20—Effect of temperature on the ultimate elongation of several thermoplastics

temperature and humidity must be considered together when cellulosic plastics are to be used in a low-temperature application.

Low temperature effects are not peculiar to plastic materials. The effect of lowering the temperature on the impact strength of a typical steel is shown in Fig. 25 (10). It will be noted that the toughness properties of this particular steel change more rapidly with temperature than do those of most polymeric materials.

Elastomeric Properties — The retention of rubberlike properties over a rather wide range of temperatures is a much sought after behavior in a group of materials generally classed as elastomeric. Included in this classification are the natural and synthetic rubbers, polyvinyl chloride, polyvinyl chloride-acetate copolymers, and others.

One of the more important properties of elastomeric materials is the so-called "stifflex" range, or the range of temperature in which the material retains suitable stiffness properties. Data on stiffness as a function of temperature for several rubber and synthetic elastomeric compounds are given in Fig. 26 (6). The natural rubber gum stock exhibits the most uniform stiffness properties between 0° and −45° C. It increases in stiffness at a rapid rate, this latter behavior being a factor that would definitely limit the rubber's usefulness in that region. The stiffness versus temperature properties of elastomeric materials can be altered within limits by varying the type and amount of plasticizer incorporated. This is illustrated by

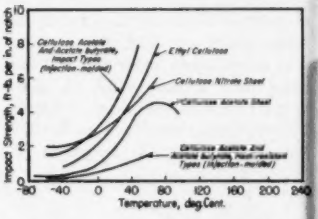


Fig. 21—Effect of temperature on the Izod impact strength of several plastics

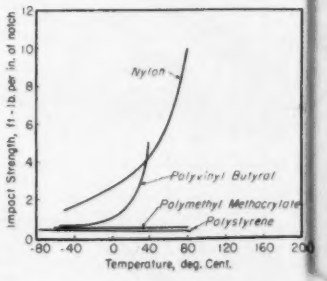
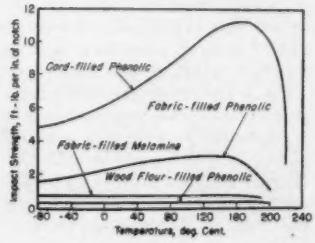


Fig. 22 (above)—Effect of temperature on Izod impact strength of several plastics. Fig. 23 (below)—Effect of temperature on Izod impact strength of several thermosetting plastics



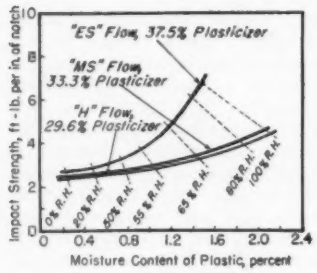


Fig. 24—Effect of moisture on the Izod impact strength of cellulose acetate at 77° F.

Fig. 27 (30). Of the plasticizers used in this particular series, trioctyl phosphate confers the most desirable low-temperature properties.

Another important property of elastomers is the brittle point or the temperature at which the material will crack when deformed at some fixed rate. Brittle point vs. plasticizer content for three different plasticizers is shown in Fig. 28 (30); here again, trioctyl phosphate results in the most desirable low temperature properties. Table IV (2) shows how brittle point varies as the amount of plasticizer used in the formulation is increased.

Creep and stress relaxation measurements provide information of a fundamental as well as a practical nature on plastic materials (31, 32). Data so obtained provide an insight into polymeric structure and into the various deformations mechanisms. Creep constants for butadiene-acrylonitrile copolymer with and without plasticizer are shown in Fig. 29 (5) plotted as a function of temperature. The creep constants were calculated for a 120-sec. loading period. Stress relaxation versus temperature data (24) for Hevea gum rubber are given in Fig. 30, where g is measured in p.s.i. at 50% elongation × 298. Tobolsky and his coworkers predict that in the temperature range from 10° to 90° C. the secondary bonds are unstable and that the primary bonds are breaking at a low rate. Above 90° C., network scission occurs, probably due to small amounts of oxygen. Below 10° C., secondary bond formation, which is of a reversible nature, becomes important.

Table IV.—Effect of Plasticizer Content on Brittle Point of Polyvinyl Chloride

Tricresyl phosphate content	*Brittle point*
% by wt.	°C.
15	>32
20	32
25	28
30	12
35	5
40	— 5
45	—26
50	—27
55	—42
60	—55

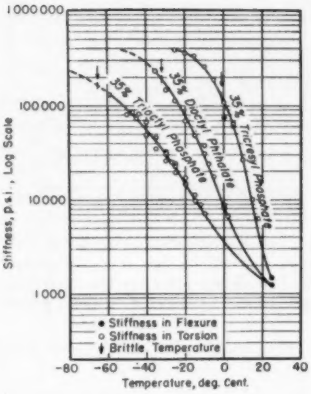


Fig. 27—Effect of temperature on stiffness of plasticized vinyl chloride copolymer[2]

Dynamic Properties—The effect of temperature on fatigue is a subject concerning which there is a scarcity of information. Findley (33) has carried out numerous experiments under varying conditions of loading and frequency at 77° F. and 50% relative humidity but as yet has published little or no data on work at low temperatures. He has shown that certain materials, notably the cellulosics, fail by softening due to the heat generated, and he has been able to stop this by cooling the specimen. Thus, for this class of materials, one could expect an improvement in fatigue properties at low temperatures. However, the possibility that the decrease in toughness with decreasing temperature might lead to poorer fatigue characteristics must be considered.

Interest in the dynamic properties

Fig. 25—Effect of temperature on impact strength of S.A.E. 1020 steel

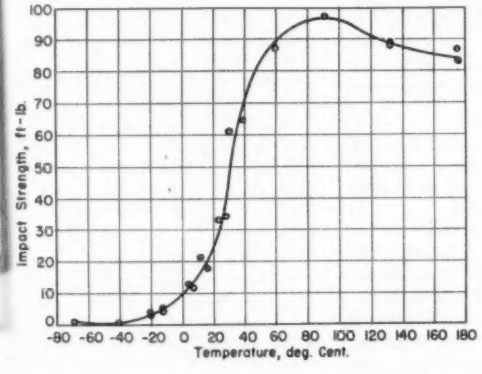
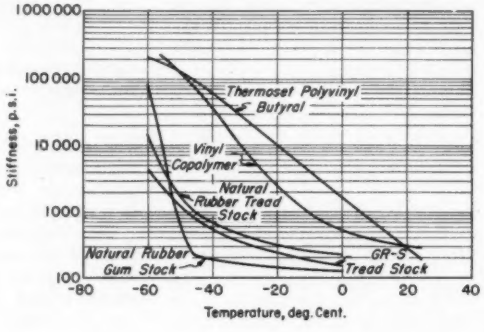


Fig. 26—Effect of temperature on stiffness of elastomers



[2] From A.S.T.M. Symposium on Plastics, Figs. 12 and 15, pp. 11 and 15 (1944). (Issued as separate publication, *STP No. 59*)

HOW TO EXTEND YOUR PLASTICIZERS!

Use S/V SOVALOID C and Cut Plasticizer Bills 30 to 90%!

If you are using conventional plasticizers for Vinyl resins and Buna N, you can actually cut your costs 30 to 90% by extending these expensive plasticizers with S/V *Sovaloid C!*

S/V *Sovaloid C* costs but a fraction of ordinary, ester-type plasticizers—yet has many processing advantages. It is completely compatible with all Vinyl and Buna N compounds. It provides effective oil-resistant qualities . . . imparts flexibility . . . increases tensile strength . . . won't migrate from the finished product.

* * *

As an extender—or as a primary plasticizer—you can't beat S/V *Sovaloid C* for efficiency and economy! Ask your Socony-Vacuum Representative for full details.

Socony-Vacuum
Process Products

Process Products
SOCONY-VACUUM

SOCONY-VACUUM OIL COMPANY, INC., 26 Broadway, New York 4, N. Y.
and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

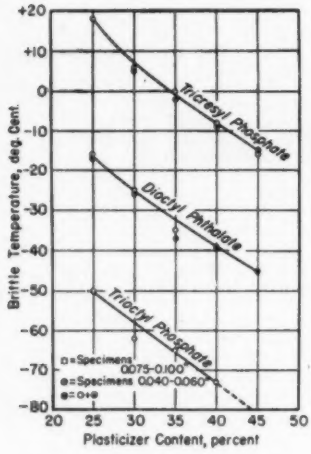
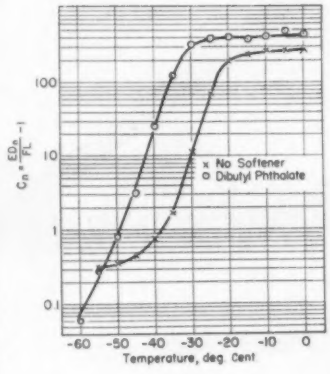


Fig. 28 (above)—Effect of plasticizer on brittle temperature of plasticized vinyl chloride copolymer[2]. Fig. 29 (below)—Effect of temperature on creep constants for butadiene-acrylonitrile copolymer elastomer



of plastic materials has been increasing rapidly during the past few years. Work has progressed to the point where it begins to appear that dynamic testing may supplant some of the conventional methods now in use. The properties determined from this type of testing are elastic modulus and damping capacity. Damping or energy absorption capacity is an extremely important property of polymeric materials. It is related to the toughness characteristics of a material. although as yet this is only qualitative. The effect of temperature on the specific energy loss for polymethyl methacrylate is

[2] See footnote, page 136

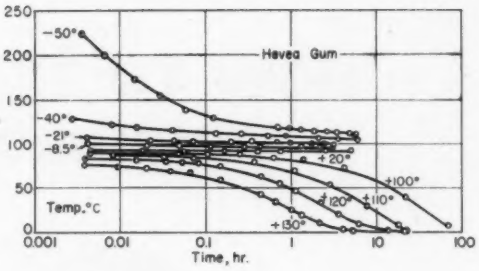


Fig. 30—Effect of temperature on stress relaxation in rubber

shown in Fig. 31 (19). The change with temperature of this property is rather rapid from 50° to 0° C. but tends to level off below 0° C. Had the studies been carried out at temperatures above 50° C., the damping capacity values probably would have passed through a maximum.

Hysteresis studies in reality are dynamic tests carried out at low frequency. The effect of temperature on hysteresis for a pure gum rubber stock is shown in Fig. 32 (11). Hysteresis in this instance is defined as a percent energy loss in a cycle; that is, the ratio of the area in the loop to the area under the ascending stress-strain curve. If this had been expressed as an absolute energy loss, the curve would have been similar to those of Fig. 31.

Electrical Properties

Plastics first proved their worth in the engineering field as electrical insulating materials. In the early days, the phenol-formaldehyde resins monopolized this market. Gradually through the years, other polymers were introduced and accepted until today the electrical engineer has wide latitude in his choice of materials, both thermosetting and thermoplastic. As is the case with other physical properties, adequate information relative to the effect of temperature on electrical properties is necessary to the intelligent application of polymeric materials as components of electrical systems.

The effect of lowering the temperature on the dielectric constant and power factor for cellulose acetate, cellulose acetate butyrate and phenolic laminate is shown in Figs. 33, 34, and 35 (12). From these data it is evident that the electrical properties vary considerably with temperature and that use conditions must be considered carefully in choosing a plastic insulation. This is likewise apparent from the data given in Table V (12). Curves for five types of acrylic polymers in which loss factor is related to temperature are given in Fig. 36 (14). Note here the effect of various substituent groups on the loss factor temperature relationship. The use of polyvinyl chloride as an insulating coating for wire has shown a tremendous increase in the past few years. Apart from its excellent electrical properties, in particular, insulation resistance, the wide acceptance of polyvinyl chloride is due to moisture resistance and

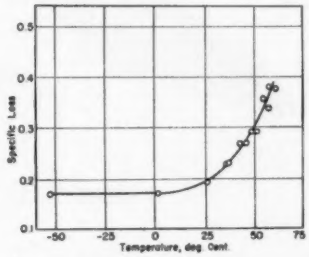
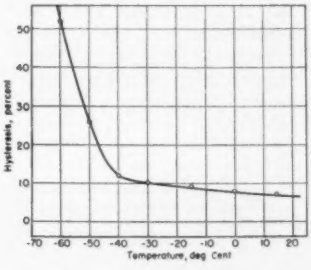
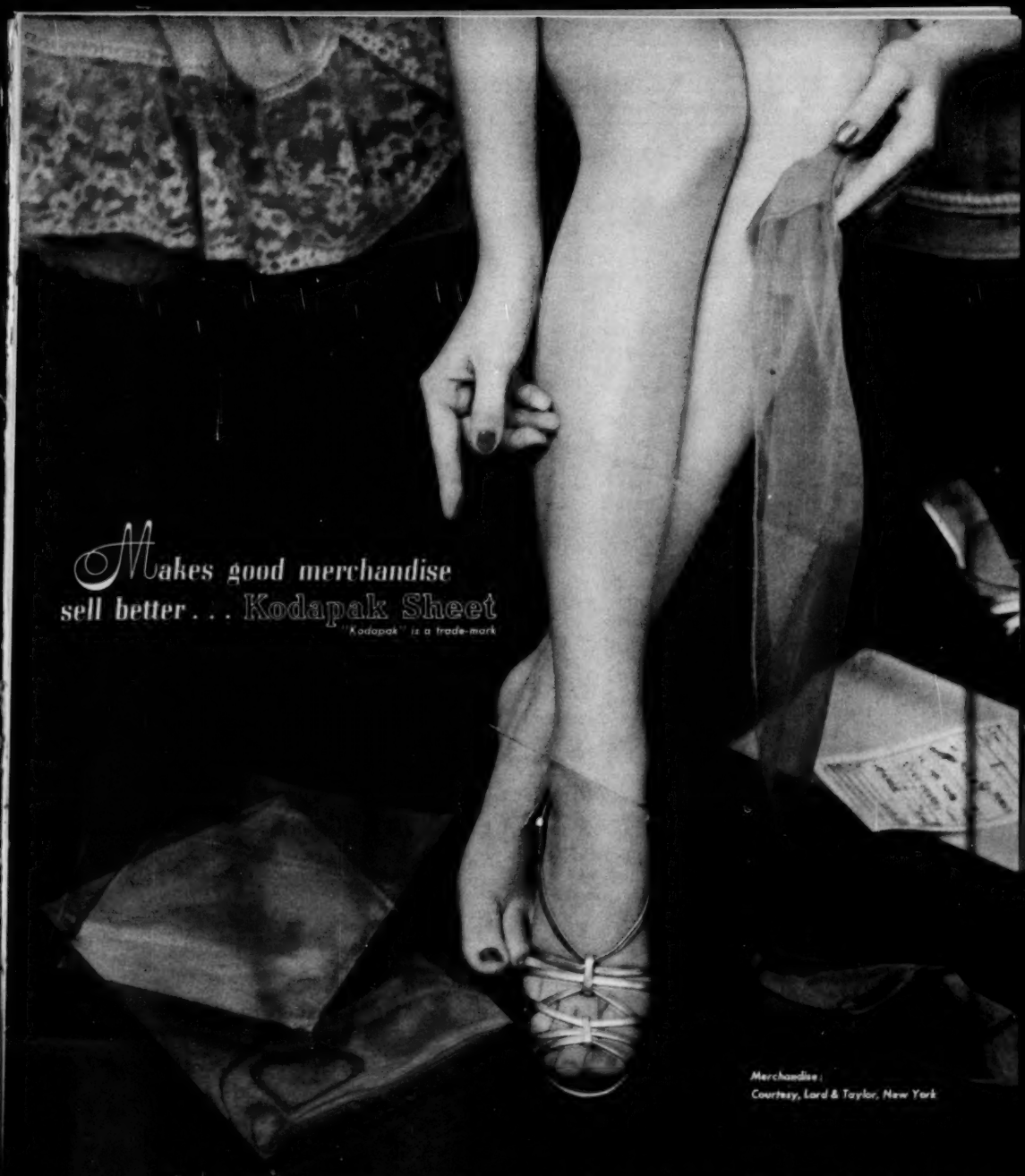


Fig. 31 (above)—Effect of temperature on hysteresis loss of polymethyl methacrylate. Fig. 32 (below)—Effect of temperature on hysteresis of gum rubber





Sheer inspiration—this. Pre-packaging hosiery in brilliant, crystal-clear Kodapak Sheet gives fresh glamour to colors . . . makes it easy for customers to study details of knit, gauge and denier—select without "snagging" or soiling the merchandise.

Due to essential government orders . . . together with critical shortages of basic materials, current supply of Kodapak Sheet is necessarily limited. In your planning, please consult your local representative or write

Cellulose Products Division
Eastman Kodak Company, Rochester 4, N. Y.

Sales offices in New York, Chicago, Dallas. Pacific Coast distributor: Wilson & Geo. Meyer & Co., San Francisco, Los Angeles, Portland, Seattle. Canadian distributor: Paper Sales Limited, Toronto, Montreal.

Table V.—Effect of Temperature on Dielectric Properties of Plastics

Material	Dielectric constant at 10^6 cy.			Power factor at 10^6 cy.		
	−70° F.	72° F.	170° F.	−70° F.	72° F.	170° F.
Cellulose acetate, H_2	1.23	3.67	4.05	0.0131	0.0452	0.0324
Cellulose acetate, S_2	1.13	4.00	4.51	0.0171	0.0522	0.0301
Cellulose acetate butyrate, H_2	1.18	3.02	3.11	0.0113	0.0202	0.0191
Cellulose acetate butyrate, S_2	2.93	3.35	4.98	0.0211	0.0249	0.0162
Grey vulcanized fiber	1.65	6.16	6.66	0.0469	0.068	0.0316
Phenolic laminate XX	1.76	4.79	5.38	0.0199	0.0439	0.0281
Phenolic laminate LE	1.73	4.65	5.45	0.0246	0.047	0.056

flexibility at low temperatures. Data relating insulation resistance (under water) to temperature are presented in Fig. 37 (37).

An excellent discussion of the effect of environment on electrical insulating materials has been contributed by Field (8). Data on temperature-resistance characteristics also are available (23).

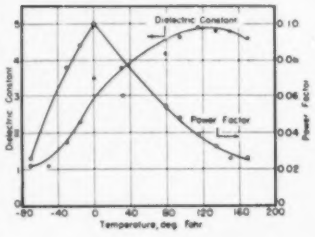


Fig. 33—Effect of temperature on dielectric constant and power factor of molded cellulose acetate (M-flow)

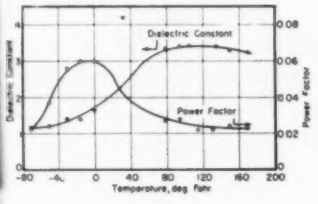
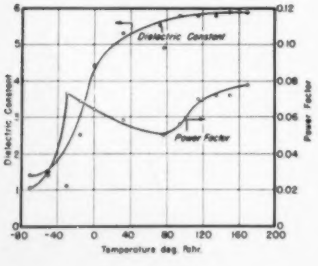


Fig. 34 (above)—Effect of temperature on dielectric constant and power factor of molded cellulose acetate butyrate (M_5-flow). Fig. 35 (below)—Effect of temperature on dielectric constant and power factor of phenolic laminate (Type LE)



Thermal Physical Constants

The effect of temperature on thermal properties is important in many applications of plastics. The low thermal conductivity of plastic materials makes them ideally suited for use as thermal insulators. Although one is apt to think of plastic materials only as "heat" insulators, further contemplation will reveal their widespread use as "cold" insulators on appliances, automobiles, aircraft, communication systems, and the like. In this sense, the plastic is used to provide a desirable feel due to its inherent low thermal conductivity properties. In the engineering sense, various foams are being used to insulate refrigerator wall panels, aircraft, and ships where a minimum rate of heat transfer is a necessity. The effect of temperature on the specific heat of polystyrene is shown in Fig. 38 (34). The rather sharp discontinuity in the slope of the curve occurs at the apparent second order transition point.

Irreversible Changes

A number of different effects brought about by lowering the temperature of a polymeric material may be classified as irreversible. Among these are permanent change of state, mechanical failure and permanent dimensional, optical and electrical changes. It should be emphasized that in many instances the polymer itself suffers no permanent structural damage but rather that the manufactured item is rendered unfit for further use. A few of the polymers which show a tendency toward crystallization are polyvinylidene chloride, polyethylene, nylon, and the rubbers, both synthetic and natural. There is some evidence that polyvinyl

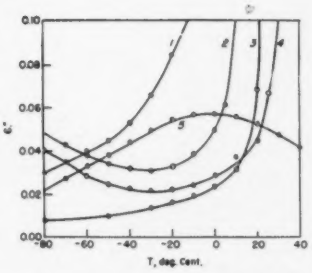


Fig. 36—Effect of temperature on loss factor of acrylic plastics (1. Polymethyl methacrylate; 2. Polymethyl acrylate; 3. Polyvinyl chloride, 20 percent plasticizer; 4. Polyvinyl chloroacetate; 5. Polyvinyl chloride)

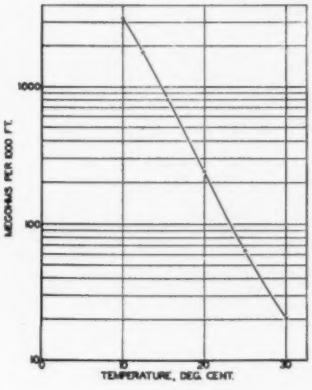
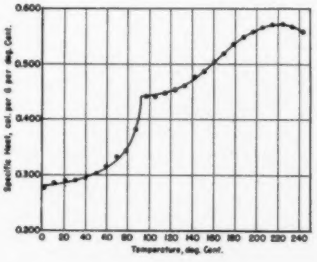


Fig. 37 (above)—Insulation resistance versus temperature of polyvinyl chloride coated wire immersed in water. Fig. 38 (below)—Effect of temperature on specific heat of polystyrene



chloride can exist in the crystalline state, although this is still a controversial issue. Torsional creep versus temperature curves for polyvinyl chloride show that the cooling curve differs from the heating curve, indicating that some irreversible structural change, possibly crystal-

(*Continued on* p. 198)

SUSPENSION

is better—particle for particle—with AERO* BRAND STEARATES

Paints, enamels, printing inks . . . in these and other applications, improved suspension means increased profits from orders and *re-orders* of your product.

Better suspension, of course, isn't the whole story. AERO Brand Stearates act as excellent internal and mold lubricants for plastics and rubber . . . improve the lubrication properties of grease . . . better the spreading characteristics of face powders and other cosmetics.

For your convenience and protection, quality-controlled AERO BRAND Stearates are available in multi-wall bags.

Write today for booklet describing AERO Brand Stearates.

*Trade-mark

A Complete Line of AERO Brand Stearates

Calcium • Aluminum • Zinc • Magnesium for

paints, lubricants, plastics, inks, rubber, cosmetics

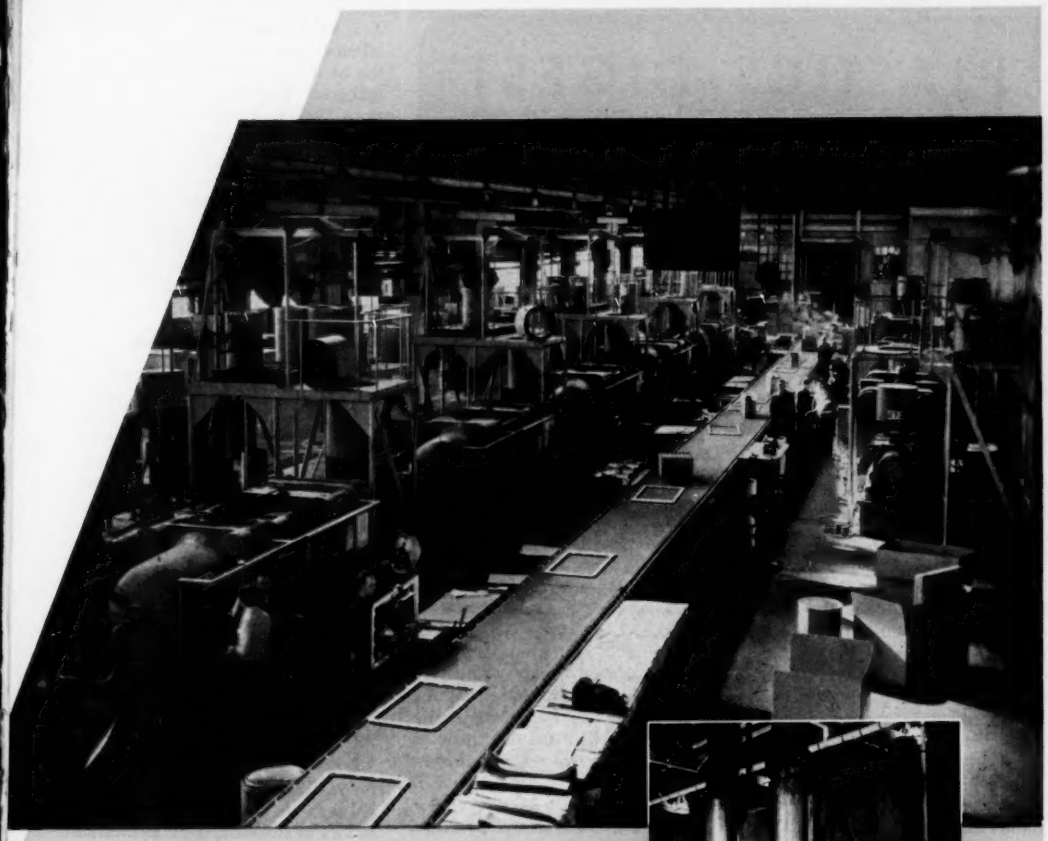
and many other uses

AMERICAN Cyanamid COMPANY

INDUSTRIAL CHEMICALS DIVISION, DEPT. MP 12

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

In Canada: North American Cyanamid Limited, Toronto and Montreal

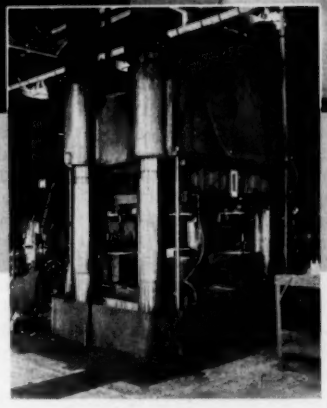


HIGH-SPEED INJECTION MOLDING

Injection equipment at General American includes largest machines ever built.

An overhead crane supplies material. Continuous conveyors carry away finished products.

1—2 oz. machine
3—8-oz. machines
2—16 oz. machines
10—22 oz. machines
4—32 oz. machines
(either Acetate or Polystyrene)
4—48 oz. machines
(either Acetate or Polystyrene)
5—48 oz. for Polystyrene
or 60 oz. for Acetate
2—85 oz. machines
(either Acetate or Polystyrene)
1—300 oz. machine
(either Acetate or Polystyrene)



MULTI-CAVITY COMPRESSION MOLDING
up to 71" x 74" platen areas

General American compression presses have turned out some of the largest plastics pieces ever produced.

3—2000 ton presses
1—1400 ton press
1—1200 ton press
2—1000 ton presses
4— 500 ton presses
10— 350 ton presses
6—100 ton presses

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 S. La Salle Street • Chicago 90, Illinois • New York 17, 10 E. 49th Street • Detroit 2, 2842 W. Grand Blvd.

PLASTICS DIGEST*

Abstracts from the world's literature of interest to those who make or use plastics or plastics products. Send requests for periodicals to the publishers listed.

General

SOME PROBLEMS IN THE PLASTIC INDUSTRY. H. V. Potter. Chem. & Ind. *1951*, 656-64 (Aug. 4, 1951). The raw material position and production of various types of plastics in the United Kingdom are discussed in detail. Comparison with U. S. production is made in some cases.

SYNTHETIC FIBERS. Chem. Eng. News *29*, 2552-57 (June 25, 1951). The types, properties, raw materials, and production of synthetic fibers are discussed.

PLASTICS LITERATURE REFERENCES. H. M. Richardson. Mech. Engineering *73*, 211-15 (Mar. 1951). Advances in plastics from July 1949 to June 1950 which are of interest to the mechanical engineer are reviewed. 139 references are given which are classified in 12 categories.

Materials

REINFORCED PLASTICS. R. J. Francis. Product Eng. *22*, 85-108 (Feb. 1951). The types of resins and reinforcing materials used in making reinforced plastics are reviewed. Molding, fabricating, properties. design factors, and applications are discussed in detail. Except for high impact "molded-laminated" and "molded-macerated" compounds, the reinforcements do not flow appreciably as they are molded, and hence different forming methods are required. Also, instead of buying a "package" compound, laminators and molders of reinforced plastics purchase resins, reinforcements and catalysts from different sources. This makes available a great number of "combinations" that the design engineer can choose from. Fiber-reinforced plastics can be visualized in the same manner as concrete reinforced with iron rods. Their physical properties, when compared on a strength-weight basis, are superior to steel, and compare very favorably with the light metals. Present cost and relatively limited production, however, rule out widespread "substitution" for metals, but where specialized physical (outstanding strength-weight ratios), electrical, and chemical properties are needed, reinforced plastics are specified on their own merits.

ULTRA-VIOLET INHIBITORS FOR CELLULOSE ACETATE-BUTYRATE PLASTICS. L. W. A. Meyer and W. M. Gearhart. Ind. Eng. Chem. *43*, 1585-91 (July 1951). Because phenyl *o*-hydroxybenzoate (salol) is an effective weathering agent for cellulose ester plastics, the isomers of this compound and their methyl ethers were studied. Ultra-violet absorption characteristics of the compounds were measured, and weathering characteristics of plastics containing these compounds were determined. Compounds which the data indicate to be most effective are *m*-hydroxyphenyl benzoate, *p*-hydroxyphenyl benzoate, phenyl *o*-hydroxybenzoate, and *o*-hydroxyphenyl benzoate. Those susceptible to quinone formation tend to become yellow on exposure. Those with methoxy substituents are less effective than the corresponding hydroxy compounds. High optical density in the ultra-violet range after irradiation seems to be an essential requirement but does not necessarily assure the material's being an effective inhibitor. This study gives further insight into the question of why an ultra-violet inhibitor is effective. By use of the knowledge gained, it is possible to improve plastic formulations, so that longer life may be expected in outdoor applications such as certain irrigation and oil field installations and certain automotive parts.

Molding and Fabricating

HOBBING CAVITIES IN ALLOY STEELS. J. L. Sekowski. SPE J. *7*, 18-19 (Sept. 1951). The hobbing process is described briefly.

EXTRUSION OF POLYSTYRENE. W. C. Goggin and J. N. McDonald, Jr. SPE J. *7*, 9-15 (Sept. 1951). Good polystyrene extrusion practice follows the basic principles of thermoplastic extrusion with only minor exceptions. Details of material, equipment, and operations are discussed. Polystyrene is an excellent plastic for extrusion providing care is exercised in 1) the selection of the material, 2) the design of extruder components, including the die, 3) the selection of the cooling, take-away, and draw rolls, and 4) use of appropriate cut-off devices.

Applications

CAST-RESIN EMBEDMENTS OF CIRCUIT SUB-UNITS AND COMPONENTS. A. E. Javitz. Elec. Manuf. *48*, 103-18 (Sept. 1951). The design possibilities, design problems, types and properties of resins used, and applications of electrical potting resins are discussed in detail.

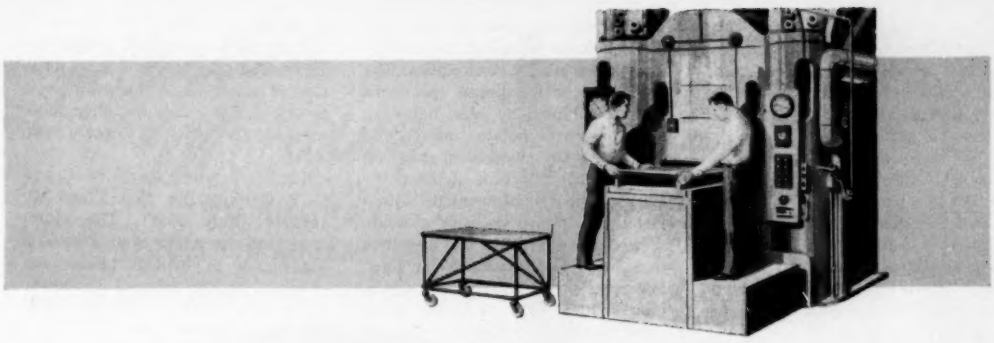
PHOTOELASTIC STRESS ANALYSIS USEFUL IN DESIGN OF METAL PARTS. M. M. Leven. Materials & Methods *33*, 89-92 (Apr. 1951). The use of cast plastics in making models for photoelastic stress analysis experiments is discussed. The properties of styrene-alkyd, cast phenolic, and allyl ester resins for this purpose are compared.

SELECTING ENGINEERING ADHESIVES. F. W. Reinhart. Product Eng. *22*, 123-9 (Sept. 1951.) The fundamental factors in adhesion, the classification of adhesives, the design of adhesive joints, the factors involved in the selection of specific adhesives, and the strength properties obtainable with typical adhesives are discussed.

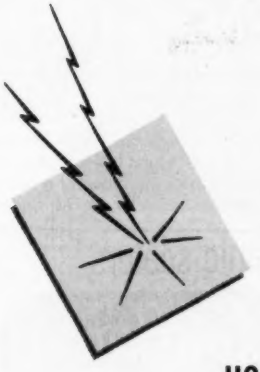
Properties

STUDY OF DEGRADATION OF POLYSTYRENE, USING INFRARED SPECTROPHOTOMETRY. B. G. Achhammer, M. J. Reiney, and F. W. Reinhart. J. Research National Bureau Standards *47*, 116-25 (Aug. 1951). Since polystyrene is a widely used plastic and styrene is an integral part of the most widely used synthetic rubber (GR-S), it appears necessary to know something of the process of degradation of polystyrene to assist in interpreting the degradation of these materials in service. Polystyrene films were exposed to heat at 100° C. in a forced-draft air oven and to ultraviolet radiant energy at 60° C. in air. Chemical structural changes in the polymer as a result of these treatments were analyzed by study

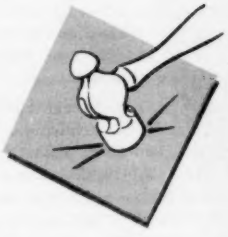
* Reg. U. S. Pat. Office



PRODUCING PAPER OR CANVAS LAMINATES?



for high strength
and
good dielectric properties



use No. 5040 PLYOPHEN

For high mechanical strength and good dielectric properties, laminates produced with RCI's No. 5040 Plyophen are standouts from every standpoint. This 100% phenol base laminating varnish may be used to produce paper or canvas laminates as good as, or better than, those produced with general purpose straight cresol varnishes. And with No. 5040, the use of modifying agents is completely eliminated. No. 5040, not a plasticized varnish, may be used to produce NEMA grades X, XX and XXX materials, as well as mechanical grades. For further facts and a working sample, write the Sales Department in New York.

REICHHOLD CHEMICALS, INC.

RCI

Executive Offices, International Building, New York 20, N.Y.
Main Plant, Detroit 20, Michigan

Other Plants: Brooklyn, New York • Elisabeth, New Jersey
South San Francisco and Azusa, California • Tuscaloosa, Alabama • Seattle, Washington • Chicago, Illinois • Charlotte, N. C. • Liverpool, England
Paris, France • Sydney, Australia • Sassenheim and Apeldoorn, Holland • Naples, Italy • Buenos Aires, Argentina • Hamburg, Germany • Toronto and Port Moody, Canada • East London, South Africa • Osaka, Japan • Werndorf, Austria • Gothenburg, Sweden • Zurich, Switzerland • Sao Paulo, Brazil

SYNTHETIC RESINS • CHEMICAL COLORS • PHENOLIC PLASTICS • PHENOL • GLYCERINE
PETHALIC ANHYDRIDE • MALEIC ANHYDRIDE • SODIUM SULFATE • SODIUM SULFITE

of the infrared spectra between 2 and 16 microns, obtained with a Baird recording infrared spectrophotometer. Ultraviolet exposure for 200 hr. resulted in absorptions at 2.9 and 5.8 microns, which are attributed to hydroxyl and carbonyl groups, respectively. Heating of the film for 270 hr. at 100° C. produced no significant change in the infrared spectrum. Prolonged heating at 125° C. resulted in the destruction of the films by flow. The literature and theory on the degradation of polystyrene are discussed.

How to Interpret Property Values of Plastics. W. Schack. Materials & Methods *33*, 66-9 (Apr. 1951). Relations between property values obtained with standard test specimens and those obtained with molded products do not always correlate. Some novel tests for use with molded parts are described.

Mechanism of the Degradation of Polyamides. B. G. Achhammer, F. W. Reinhart, and G. M. Kline. J. Applied Chem. *1*, 301-20 (July 1951). Films of polyamides were exposed to heat, ultra-violet radiant energy, and different atmospheric conditions. The degradation products were collected in some cases and analyzed by mass-spectrometric techniques. The unexposed and exposed specimens were examined by the following techniques to obtain information concerning the changes in chemical and physical structure of the polymer: infra-red absorption, ultraviolet absorption, viscosity of solutions, measurement of dielectric constant and dissipation factor, photomicrography, X-ray diffraction, electron microscopy, and effect of organic liquids. In addition, pyrolysis studies were made, and some physical properties were determined. The results of the investigation show clearly that no single method gives a complete picture but that the results from several of the methods give an insight into the degradation mechanism. The general course of the degradation of polyamides may be described as follows: 1) splitting of the polymer chain at the C-N linkages; 2) changes in degree of crystallinity or local order; and 3) loss of dipole-associated plasticizers.

Sorption of Water Vapor by Proteins and Polymers: A Review. A. D. McLaren and J. W. Rowen. J. Polymer Sci. *7*, 289-324 (Aug.-Sept. 1951). The information on the sorption of water vapor by proteins is reviewed. Some data on other polymers are also included. 85 references.

The Nature of Tack. A. Voet and C. F. Geffken. Ind. Eng. Chem. *43*, 1614-24 (July 1951). The older, static interpretation of tackiness is inadequate to explain phenomena observed at high rates of film separation. The dynamics of tackiness of liquids in general and of printing inks in particular were studied. It was found that rapid film separation does not occur by liquid flow as previously thought, but is the result of a visco-elastic response of the liquid, which may (more or less) react as a solid toward rapidly applied stresses. Evidence was found that tackiness is not an essential attribute of every viscous liquid but must be considered as a typical reaction of a freely moving long-chain molecule to stresses of short duration. This study results in certain theoretical predictions of ink behavior on a press. It provides a physical basis for a newer conception of tackiness of liquids

and may lead to a fuller understanding of the phenomena occurring when films of liquid adhesives are subjected to rapidly changing stresses.

Testing

AN IMPROVED ELECTRONIC FLEXOMETER FOR BENDING ANALYSIS AND STIFFNESS STUDIES OF FABRICS AND THIN PLASTICS. H. H. Hebeler, H. J. Kolb, J. W. Stillman, and J. H. Baldt. ASTM Bull. No. 176, 52-5 (Sept. 1951). A new improved electronic flexometer for measuring bending properties of fabrics and plastic films is described. The flexometer contains a measuring element that undergoes little motion during the bending cycle, a variable but controlled bending rate, and an electronic recording device that enables a permanent record to be obtained. It is adaptable for the determination of bending modulus, variation of modulus with degree and rate of bending, elastic and creep recovery, and variation of recovery properties with degree and rate of bending.

DICHLOROACETIC ACID AS A COLOR REAGENT FOR RESINS. R. Castle. Chem. & Ind. *1951*, 129 (Feb. 17). Dichloroacetic acid is used as a color reagent to identify resins in tests similar to the Hirchsohn and Liebermann-Storch tests. The color is observed when 1 ml. of dichloroacetic acid is shaken with 0.05-0.1 g. of the resin without heating.

A RAPID WATER-VAPOR-PERMEABILITY COMPARATOR. C. R. Oswin. Chem. & Ind. *1951*, 444 (June 9). Apparatus and procedure are described for obtaining comparative water vapor permeability measurements of film materials rapidly. It is based on the use of radioactive hydrogen.

AN ELECTRIC TIMING AND OPERATING MECHANISM FOR A BITUMEN TESTING PENETROMETER. B. M. Holmes. ASTM Bull. No. 175, 81-4 (July 1951). A device for obtaining accurate automatic operation of an ordinary bitumen-testing penetrometer is described. The apparatus consists of a solenoid release attachment, controlled by an electronic timer based on a thyratron delay circuit of standard design. With this attachment, it is possible to reproduce the nominal 5-sec. plunger release period, normally employed for penetration tests, with an accuracy of ± 0.4 percent.

U. S. PLASTICS PATENTS

Copies of these patents are available from the U. S. Patent Office, Washington, D.C., at 25¢ each.

POLYMERIZATION. F. E. Frey and F. E. Condon (to Phillips Petroleum). U.S. 2,562,090, July 24. Polymerization of dibromobutene with an alkali metal.

TETRAFLUOROETHYLENE. Le V. K. Osdal (to Du Font). U.S. 2 562,117-8, July 24. Coatings of polytetrafluoroethylene and chromic acid alone or together with phosphoric acid.

COATING. H. J. Haon (to Du Pont). U.S. 2,562,119, July 24. Coating comprising chromic acid and chlorinated polyethylene.

COPOLYMERS. E. H. Dafter, Jr. (to American Cyanamid). U.S. 2,562,140, July 24. Gelled dispersions of an alkyd resin and a vinylidine compound.

HOLLOW PLASTICS. C. L. Milton, Jr. (to U.S.). U.S. 2,562,204, July 31. Hollow articles of a mixture of polyvinyl chloride and acrylate polymer.

EMULSIONS. J. J. P. Staudinger and D. C. Bournemouth (to Distillers). U.S. 2,562,440, July 31. Emulsions of vinyl esters or acrylic esters.

MODIFIED PROTEINS. J. R. Coffman (to General Mills). U.S. 2,562,534, July 31. Reaction product of a protein with acrylonitrile or methyl acrylate.

COPOLYMERS. J. R. Roach (to General Mills). U.S. 2,562,537, July 31. A copolymer of styrene, an unsaturated, fatty oil, and a polyallyl ether.

LAMINATES. S. G. Saunders (to Chrysler). U.S. 2,562,641, July 31. Method of making laminates continuously.

POLYAMIDES. T. Koch (to American Enka). U.S. 2,562,796-7, July 31. Polyamide condensates of an omega-lactam.

CONDENSATES. I. Mankowich and C. H. Day (to U.S. Rubber). U.S. 2,562,802-3, July 31. Condensates of ketones and diarylamines.

POLYMERS. M. Baer (to Monsanto). U.S. 2,562,852-3, July 31. Copolymers of unsaturated carboxylic acids with esters of unsaturated alcohols.

CHLORINATED CARBOHYDRATES. H. N. Barham (to Sharples Chemicals). U.S. 2,562,882-3-4, Aug. 7. Chlorinated cellulose, cellulose ester, or sugar ether.

COPOLYMERS. E. K. Ellingboe (to Du Pont). U.S. 2,562,897, Aug. 7. Copolymers of vinyl chloride, allyl glycidyl ether, and allyl esters of hydroxyalkanoic acids.

LIGNIN RESINS. R. N. Evans and A. P. Ingassia (to Masonite). U.S. 2,562,898, Aug. 7. Reaction product of alkali-soluble lignin, furfural, an aminotriazine, and an aldehyde.

EMULSION POLYMERIZATION. C. H. Portser, Jr. (to Armstrong Cork). U.S. 2,562,944, Aug. 7. Emulsion copolymerization of diolefins with a vinyl compound in the presence of an aromatic aldehyde and a hydroxy carboxylic acid.

MOLDING COMPOUNDS. P. O. Powers (to Armstrong Cork). U.S. 2,562,945, Aug. 7. Molding compounds containing a condensate of *o*-hydroxy benzyl alcohol and *o*-methylol-*p*-methylol phenol.

ARMOR. A. Rose and G. J. Merritt. U.S. 2,562,951, Aug. 7. Layers of glass yarn bonded with thermosetting resin.

COPOLYMERS. J. B. Rust (to Montclair Research and Ellis-Foster). U.S. 2,562,953, Aug. 7. Organo-silicon copolymers.

CELLULOSE DERIVATIVES. H. A. Schuyten, J. W. Weaver, and J. D. Reid (to U.S.). U.S. 2,562,955, Aug 7. Alkyl-silyl cellulose.

POLYMERIZATION. D. Swern, E. F. Jordan, Jr., and W. S. Port (to U.S.). U.S. 2,562,965, Aug. 7. Emulsion polymerization of long-chain vinyl esters.

LAMINATED AIRFOIL. R. G. Winnick (to United Aircraft). U.S. 2,562,976, Aug. 7. Laminated composite of spaced metal surface sheets and an intermediate core sheet of adhesively bonded wood pieces bonded to the surface sheets.

ORGANOSILICON MATERIALS. H. A. Clark (to Dow Corning). U.S. 2 563,-004, Aug. 7. Organosilicon materials containing silicon-silicon-carbon as a repeating structure.

POLYSILANES. H. A. Clark (to Dow Corning). U.S. 2,563,005, Aug. 7. Organopolysilane resins.

POLYMERS. H. W. Durand (to Corn Products). U.S. 2,563,014, Aug. 7. Polymerization of cornstarch conversion liquor.

COAGULATION. R. H. M. Meyer and J. Dijkstra (to Shell). U.S. 2,563,055, Aug. 7. Coagulating vinyl polymer emulsions.

INTERPOLYMERS. G. W. Smith (to B. F. Goodrich). U.S. 2,563 079, Aug. 7. Interpolymers of vinyl chloride, alkyl acrylate, and vinylidene chloride.

POLYESTER. J. C. Patrick and H. R. Ferguson (to Thiokol). U.S. 2,563,-133, Aug. 7. Reaction products of polycarboxylic acids and polythiols.

GLASS FIBERS. R. Steinman (to Fiberglas). U.S. 2 563,288-9, Aug. 7. Treating glass fibers to improve their adhesion to polymeric materials.

POLYVINYL HALIDES. J. Dazzi (to Monsanto). U.S. 2,563,312-3, Aug. 7. Plasticizers for polyvinyl halides.

POLYMER. W. E. Vaughan and F. F. Rust (to Shell). U.S. 2,563,383, Aug. 7. Terminally unsaturated polythiopolyethers.

EXTRUSION. R. Colombo (to Liguna S.A.). U.S. 2,563,396-7, Aug. 7. Thermoplastic extrusion of tubes and other articles.

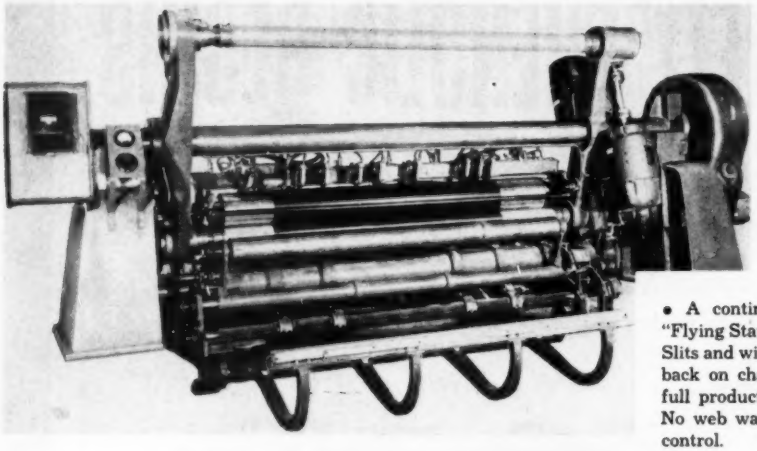
COPOLYMER. E. K. Ellingboe and M. J. Roedel (to Du Pont). U.S. 2,563,459, Aug. 7. Vinyl chloride-alkoxymethoxy-alkyl vinyl ether copolymer.

VINYL RESINS. M. A. Pollack. U.S. 2,563,485, Aug. 7. Phenyl esters of unsaturated fatty acids as vinyl chloride plasticizers.

POLYMERS. R. G. Flowers and E. D. Elliott, Jr. (to G.E.). U.S. 2,563,524, Aug. 7. Polymers and copolymers of acenaphthylene.

POLYMERS. K. M. Gaver, E. P. Lasure, and L. M. Thomas (to

KOHLER SYSTEM PLASTIC WINDER



controlled production-plastic winding

• A continuous winder with Kohler "Flying Starter." Employs no adhesives. Slits and winds without wrinkles or fold back on changing of cone sizes and at full production speeds. No down time. No web waste or relaxation of tension control.

Write, call or wire **Dilts** for complete data

DILTS MACHINE WORKS, Fulton, New York
Division of The Black-Clawson Co., Hamilton, Ohio

ORGANIC PEROXIDES

LUPERSOL* DDM

60% METHYL ETHYL KETONE PEROXIDE IN DIMETHYL PHTHALATE

WATER WHITE LIQUID

11% ACTIVE OXYGEN

LOW TEMPERATURE CATALYST FOR POLYESTER RESINS

TECHNICAL DATA AND SAMPLES AVAILABLE UPON REQUEST

*REGISTERED TRADE MARK

LUCIDOL DIVISION
NOVADEL-AGENE CORPORATION
BUFFALO 5, NEW YORK

FORM GRINDING of cylindrical parts from non metallic materials is our specialty. Our range of size is from 1/8 to 3/4 diameter and up to 7" long. We can hold tolerances of ±.002 on plastic and ±.005 on wood.

• If you make such parts or are planning a change from aluminum, brass or steel screw machine parts we can increase your production capacity. Send a print or sample for quotation.

Keever Starch). U.S. 2,563,526, Aug. 7. Reaction of glucopyranose polymers with substituted ammonium hydroxides.

POLYSILOXANES. M. M. Safford (to G.E.). U.S. 2,563,555, Aug. 7. Reinforced elastic organo-polysiloxanes containing treated pigments.

POLYMERS. J. Dazzi (to Monsanto). U.S. 2,563,586, Aug. 7. Resinous compositions from alkyl mercapto ethyl alcohols.

COPOLYMERS. G. E. Ham. and D. T. Mowry (to Monsanto). U.S. 2,563,602, Aug. 7. Copolymers of vinyl acetate and vinyl halobenzoates.

COPOLYMERS. G. L. Mills, Jr. and J. M. Butler (to Monsanto). U.S. 2,563,611, Aug. 7. Copolymers of styrene and phenylallyl alcohol.

RESIN. R. Palmer (to Continental-Diamond Fibre). U.S. 2,563,614. Aug. 7. Alkaline-catalyzed phenol-formaldehyde resin.

RESIN. H. P. Wohnsiedler and W. M. Thomas (to American Cyanamid). U.S. 2,563,630, Aug. 7. Melamine-formaldehyde resin.

COPOLYMERS. D. W. Young and W. M. Smyers (to Standard Oil). U.S. 2,563,631, Aug. 7. Liquid copolymers of ethylene and styrene.

POLYMERS. R. L. Brown (to Du Pont). U.S. 2,563,640, Aug. 7. Treating nitrile polymers with ammonia and a hydrosulfide.

POLYMER TREATMENT. G. M. Rothrock (to Du Pont). U.S. 2,563,662, Aug. 7. The treating of nitrile polymers with amines and hydrogen sulfide.

EMULSIONS. C. L. Crane (to Eastman Kodak). U.S. 2,563,708. Aug. 7. Aqueous emulsions of cellulose esters.

STABILIZERS. H. A. Cheney (to Shell). U.S. 2,563,772, Aug. 7. Iron salts as stabilizers for halogen-containing polymers.

POLYMERS. J. B. Dickey and H. W. Coover (to Eastman Kodak). U.S. 2,563,776, Aug. 7. Polymers of alpha substituted acrylic acids and esters thereof.

INTERPOLYMERS. W. T. C. Tammond (to Sherwin-Williams). U.S. 2,563,784, Aug. 7. The interpolymerization of a vinyl aromatic compound and an oil-modified alkyd in the presence of sulfur.

ROSIN ESTERS. J. B. Rust and W. B. Canfield (to Montclair Research and Ellis-Foster). U.S. 2,563,870-1-2-3, Aug. 14. Unsaturated monohydric phenolic ether-modified drying oils and rosin esters.

SIZING. L. H. Wilson, C. G. Landes, and C. S. Maxwell (to American Cyanamid) U.S. 2,563,897-8, Aug. 14. Sizing cellulosic fibers with cationic melamine resin and an impregnating resin.

POLYAMIDES. M. Grenas (to Societe Organico). U.S. 2,564 001, Aug. 14. The producing of polyamides by the condensing of aminocarboxylic acids in the presence of hypophosphorous acid.

POLYMERS. W. T. Miller (to U. S.). U.S. 2,564,024, Aug. 14. Polymerizing halocarbon monomers in the presence of elemental oxygen.

POLYMER. F. C. Bersworth. U.S. 2,564,032, Aug. 14. A polyethylene polyamino acid compound.

RESINS. M. DeGroote and B. Keiser (to Petrolite). U.S. 2,564,191-2, Aug.

14. The oxyalkylated derivatives of difunctional bis-phenol aldehyde resins.

MOLDING. J. W. Hendry. U.S. 2,564,203, Aug. 14. A processing chamber support used for plastic molding machines.

POLYMERIZATION. R. J. Wolf (to B. F. Goodrich). U.S. 2,564,291-2, Aug. 14. Polymerization of vinyl chloride in water with phenol-aldehyde condensate as emulsifying agent.

COPOLYMERS. H. Dannenberg and T. F. Bradley (to Shell Development). U.S. 2,564,395, Aug. 14. Copolymers of diallyl phthalate and diallyl esters of dimerized unsaturated fatty acids.

STABILIZER. G. H. Pyle and D. R. Wiggam (to Hercules). U.S. 2,564,581, Aug. 14. Cellulose ether plastics stabilized with sulfur dioxide liberating terpene derivative.

VINYL CHLORIDE. W. E. Leistner, A. C. Hecker, and O. H. Knoepke (to Argus Chemical). U.S. 2,564,646, Aug. 14. Vinyl halide resin made haze-resistant with an aryl phosphite.

FURAN RESINS. B. Thomas (to Delvac). U.S. 2,564,653, Aug. 14. Liquid furan resin from furfuryl alcohol and furfural.

CARTRIDGE CASE. A. C. Johnson, Jr. and R. O. Phillips. U.S. 2,564,695, Aug. 21. Plastic cartridge case.

POLYMERS. W. R. Sauer (to Du Pont). U.S. 2,564,726, Aug. 21. Salt of a vinylpyridine polymer with an acid dye.

POLYMERS. A. P. Dunlop and P. R. Stout (to Quaker Oats). U.S. 2,564,835, Aug. 21. Hydrogenated furfuryl alcohol partial polymers.

MELAMINE RESIN. J. D. Pollard (to American Cyanamid). U.S. 2,564,925, Aug. 21. Stabilized acidic solution of melamine-formaldehyde resin and urea.

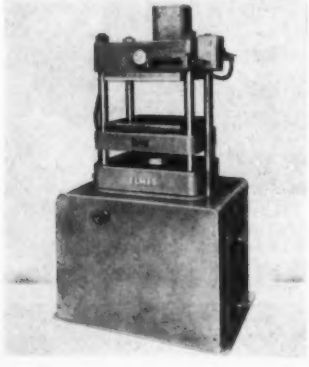
HEATING DEVICE. J. Simorda (to Bata, Norodni Podnik). U.S. 2,565,003, Aug. 21. Apparatus for continuous heating of plastics in a high-frequency field.

METHYL METHACRYLATE. B. M. Marks (to Du Pont). U.S. 2,565,141, Aug. 21. Polymerizing methyl methacrylate in the presence of a di-alkyl monosulfide heat stabilizer.

NEW MACHINERY AND EQUIPMENT

GEL-TIME METER—Time required for fluid thermosetting compositions to reach a point of rapid viscosity change during polymerization can be measured on a new gel-time meter developed by Special Products Div., General Electric Co., Schenectady 5, N. Y. Main objectives of the device are: to aid in evaluating thermosetting compositions used in making monomers, resins, varnishes, and other protective coatings; and to study effects of such variables as reaction temperatures, catalysts, inhibitors, and quality of the main reactant. Features claimed for the instrument include: stops automatically when gel point is reached; has both audible and visible indicating systems; can be read to 0.1 min.; maintains constant bath temperature; and bath temperature is adjustable by changing the liquid.

ELECTRICALLY CONTROLLED "HYDROLAIR"—Small, lightweight, inexpensive plastic molding presses, designed and constructed on an hydraulic principle said to greatly reduce production costs, the Hydrolair units are now being furnished with semi-automatic pushbutton operation by American Steel Foundries, Elmes Engineering Div., 1150 Tennessee Avenue, Cincinnati 29, Ohio. The presses, taking their power entirely from the shop air line, are fast and full power-operated, with continuous high-pressure stroke. The pressure selected is automatically applied and maintained, even on compressible materials. The Hydrolairs are available in a 50-ton floor model with either lever or electrical control, and also 30-ton bench and floor models with lever control only.



FLOW CONTROL VALVE—Flow of bulk materials from bins, hoppers, and chutes in weighing, blending, and packaging functions can be controlled by a new valve developed by Syntron Co., 390 Lexington, Homer City, Pa. The valve has a flexible diaphragm made of cotton duck, nylon, rubber, or other suitable material. By rotating a control lever, the diaphragm opening and, hence, the flow of material, is increased or decreased. Since flowing material does not come into contact with any moving metal valve parts, the possibility of jamming and clogging is said to be eliminated. Fabric diaphragms are available in five sizes to fit diameter openings up to 12 inches. The valve is also applicable to free air control in heating, ventilating, and drying.

SHEATHED ELECTRIC HEATING ELEMENT—Flat, sheathed, electric heating elements for economical industrial heating operations have been introduced by Syntron Co., 390 Lexington Ave., Homer City, Pa., for the following applications: direct or indirect immersion in liquids; contact with plates, pipes, and other surfaces; or mounting in enclosed areas or on platens, kettles, ovens, dies, etc.

Available in widths of $1\frac{1}{32}$ and $2\frac{1}{32}$ in., both $\frac{5}{32}$ in. thick, and in lengths of from 9 to 124 in., the units are ruggedly built, readily bent and formed, and resistant to moisture and vibration. Self-regulating elements can be supplied in which wattage will vary inversely with heater temperature.

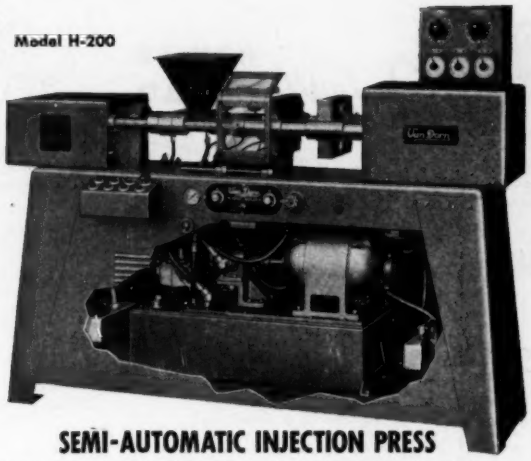
These elements are proof against sparking or arcing through their sheaths, which are usually copper or steel. Various terminals are provided, or heaters can be brazed or welded into fittings or supplied with hold-down straps or brackets.

SANDING UNIT—A coated abrasive belt sanding unit especially designed for inside diameter sanding, grinding, and polishing work has been developed by Behr-Manning Corp., Troy, N.Y. The unit, called a Tongue Sander, is not manufactured or sold, but can be easily assembled using standard available parts and following the instructions in the company's Products Engineering Bulletin No. 10. It is adaptable to either free running or platen backed coated abrasive belt operations, and has already proved successful on bomb straps, horn rings, gas tank necks, tin snips, and heavy shear rings. On one successful model built to sand a $2\frac{3}{8}$ by $1\frac{1}{4}$ in. wide ring in a tin snip, the following materials were used: a ½ by 132 in., 80-X Resinall Metalite cloth

belt; a 38 KTT Fafnir bearing; a 3-in. Delta idler pulley setup; a 1725 r.p.m., ¾ hp. motor with a 5½-in. diameter pulley that generated 2600 S.F.P.M. belt speed. The bulletin lists other bearings that can also be used.

HEATERS—Installation of a series of Thermaheater heaters, made by Thermel, Inc., 3440 W. Lake St., Chicago 24, Ill., on a 70-in. plastic sheeting die has made it possible to hold the extruding die at temperatures up to 800° F. with little variation in temperature along the length of the die. The assemblage consists of six cast-in aluminum-bronze Thermaheaters on the die proper and three on the throat assembly between extruder and die. Durability is achieved by use of multiple numbers of heating elements of conservative ratings in the castings. When processing materials at temperatures

Model H-200



SEMI-AUTOMATIC INJECTION PRESS

2-oz. capacity. Van Dorn's engineering experience has scored again with this leader among all injection presses of its class. Its ultra-modern design insures faster operating cycles—up to 6 per minute. Push button controls are safe, simple and convenient. Accurate temperature regulation. Ruggedly built, compact and quiet.

Model H-200

Power Operated, Lever Controlled Presses—Available in 2-oz. or 1-oz. models. These profit-makers feature: Rugged all-welded construction; built-in safety devices; heating chamber with ample plasticizing capacity.

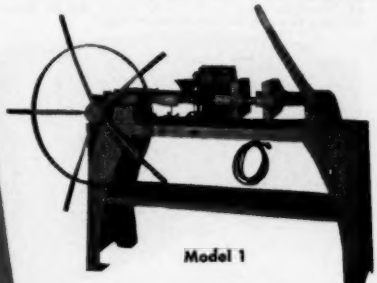
VAN DORN
Plastic Equipment

COSTS LESS to Buy...to Operate!

Van Dorn presses are *unexcelled in efficiency* and *unequalled in economy* on the innumerable jobs where a 2-oz. injection is ample. Costwise, Van Dorn presses are outstanding for these reasons:

1. **Surprisingly low in price**
2. **Operate 8 hours for a few dollars**
3. **Use less expensive molds**
4. **Easily set up by one man in a few minutes**

These presses mold practically all thermoplastics including nylon . . . Look over the Van Dorn presses and plastic equipment shown—*then write for detailed Bulletins on individual machines.*

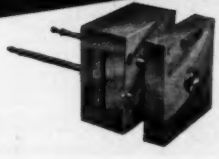


Model 1

Manually Operated Press
1-oz. capacity. Ideal for smaller jobs, experimental work, training.

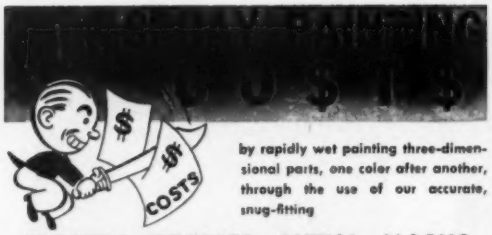
Plastic Grinder
Grinds up rejects, waste, etc., for re-use. Ruggedly made, easily cleaned.

Model G-100



Mold Bases
. . . Available from stock for all Van Dorn presses.

THE Van Dorn IRON WORKS CO.
2687 EAST 79th STREET • CLEVELAND 4, OHIO
Cable Address: "VANDORN" Cleveland



by rapidly wet painting three-dimensional parts, one color after another, through the use of our accurate, snug-fitting

ELECTRO-FORMED METAL MASKS

(Made by Patented Process)

and foot treadle

AIR-OPERATED FIXTURES

which position and hold the piece snugly in the mask, maintain the desired pressure, and permit the operator to use both hands.

Plug-type masks for keeping depressed areas clear, while spraying background; lip-type masks for protecting the background while painting depressed areas; and block cutout plane surface type masks.

Clean, sharply defined letters and decorative effects are obtained on intricate die castings, stampings and plastic forms by accurate control of painted areas with no fogged edges. After-wiping or buffing off of overspray is unnecessary. The "loose" inside of letters and numerals, such as "O" and "6", is held in position by arched bridging to eliminate objectionable "ties."

We also design, engineer and build

COMPLETE AUTOMATIC SPRAY EQUIPMENT

(with or without masks)

MASK WASHING EQUIPMENT and AIR-OPERATED CLAMPS, FIXTURES AND TOOLS for

positioning parts in masks while painting or holding parts in place for other operations, such as welding.

Automatic, entirely air-operated machines for spray decorating a variety of small plastic and metal parts—one color after another—at speeds of up to 3600 per hour.

Eliminates the hazards of electric motors, mercury or solenoid switches and the cost of explosion-proof electrical equipment.

Masks are inserted so as to be flush with top of the working table. Spraying is from below. Frequency of mask cleaning greatly reduced. Dial regulates the cycling speed. Using a conveyor belt, operator can use both hands to load.

Another dial regulates the amount of paint sprayed. At any given setting, the same amount of paint is sprayed on every part, regardless of the speed of the loading cycle. Effects paint savings of up to 50 percent over hand spraying.

Employs 8 latest automatic guns and two 2-gallon air-agitated paint pressure tanks with four insert containers.

SEND COUPON NOW!

CONFORMING MATRIX CORPORATION

364 Toledo Factories Building — Toledo 2, Ohio

Please send, without obligation, details on ( ) Hand masks; ( ) Mechanical masking fixtures; ( ) Air-operated masking fixtures; ( ) Stationary automatic spray painting masking machines; ( ) Rotary table automatic spray painting masking machines; ( ) Quotation on masks for parts (or prints) which I am forwarding.

Name .....

Firm .....

Street .....

City ..... State .....

Jacques **POWER SHEAR**

For the faster cutting of rolls or sheets, with power or hand feeds and receivers, adaptable to automatic cutting with pre-set or manual gauging.

Write today for new illustrated folder.

HOBBS MANUFACTURING CO.

EST. 1882

25 Salisbury St., Worcester 5, Mass.

Manufacturers of:

JACQUES Hand and Power Shears, Slitters and Rewinders, **AUTOTRONIC** and **TRI-POWER** Die Presses, **HOBBS** Paper Box Machinery and Touch-O-Matic Cutters.

For the kind of craftmanship that New England is famous for

Depend on SCOTT

Custom Molding

Even though SCOTT is BUSY on Prime Contracts for the Government, our Custom Molding, Engineering, and Moldmaking facilities are Available to you.

The

GEO. S. SCOTT

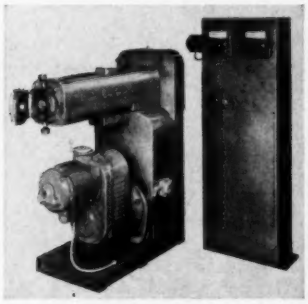
MFG. CO.

Custom Molders of Plastics Products

WALLINGFORD • CONNECTICUT

up to 750° F., aluminum can be used as the casting medium, but for operating temperatures of 800° F, aluminum-bronze is needed.

PLASTICS EXTRUDER—A new low cost electrically heated plastics extruder, known as the NRM 1½-in. Economy Model, is now being manufactured by the Plastics Machinery Div., National Rubber Machinery Co., 47 West Exchange St., Akron 8, Ohio. Designed for experimental work and small cross-section production extrusions, it has a nominal plasticizing capacity of 30 to 35 lb./hr. of most thermoplastic extrusion compounds. Special features include standard alloy steel, heat treated, chrome plated screw with hardened flights, hollow-bored for water cooling with rotary union; cylinder with removable front flange lined with corrosion resistant



Xaloy 306; adjustable speed drive mounted in the extruder base; die adaptor gate hinged for quick changing of screen; and band type heaters with two heating zones, controlled by pyrometer type temperature controllers located in separate cabinets containing all instruments and necessary wiring.

TAPS—An important departure in design of standard taps is the new "specific" standard taps being manufactured by Detroit Tap and Tool Co., 415 Boulevard Bldg., Detroit 2, Mich. These taps, designed and produced for the tapping of specific materials, will augment the present line of general purpose taps. They are available for the following materials: steel and other tough materials; cast iron; aluminum, magnesium, and other light materials; zinc die casting metals; plastics.

BOOKS AND BOOKLETS

Write for these publications to the companies listed. Unless otherwise specified, they will be sent gratis to executives who request them on business stationery.

"Exhibit Techniques," Edited by Helen Miles Davis

Published by Science Service, Inc., 1719 N Street, N. W., Washington 6, D.C. 112 pages. Price $2.00.

For those who build exhibits for fairs and other displays, this book offers a wide variety of details and suggestions. It describes a number of ways of planning an exhibit with effective panels, lettering, and labeling. Display ideas such as moving platforms, flashers, illusion boxes, and other methods for making an exhibit easier to view and understand are detailed and illustrated. Included are over 20 descriptions of exhibits and projects that have been shown successfully.

"The Seamless Story," by J. Perc Boore

Published by The Commonwealth Press, Inc., 1507 DeLong Street, Los Angeles 15, Calif. 285 pages. Price $5.75.

A thorough background in the history of the development of tubing with no seams or welds is offered in this book by an author with extensive experience in the field. Included is well-researched material on the history of the invention, the story of the inventors, the development of the product, and an outline of contemporary mills and their evolution into their present forms. The book also contains illustrated biographies of the personalities in the industry. An excellent bibliography presents an extensive listing of publications.

"Plastics for the Home Craftsman," by Harry Walton

Published in 1951 by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. 191 pages. Price $4.00.

For craftsmen who enjoy working with plastics materials, particularly acrylic, this book offers design suggestions for utilitarian and decorative objects that can be made in a home workshop. Simple instructions, working drawings, and photographs outline each step in the creation of plastic ornaments from the original cutting of the material to the finishing process. Details on the selection, waxing, and storage of plastic sheets are provided, together with different methods of production, such as carving techniques (cutting, drilling, smoothing, polishing, and internal carving) and molding operations (bending, twisting, and shaping). Piping light through plastic and embedding objects are two of the special techniques discussed.

"Davison's Rayon and Silk Trades"

Published in 1951 by Davison Publishing Co., Ridgewood, N. J. 528 pages. Price $7.50 (office edition); $5.50 (pocket edition).

The current edition of the annual register and technical compendium of the rayon, nylon, and other synthetics and silk industries of the United States and Canada consists primarily of a state-by-state listing of manufacturers' mills and a directory of dyers, printers, and finishers. Appended to the dealers' section is technical information of interest to members of the trade.

"Phase Transformations in Solids," by R. Smoluchowski, J. E. Mayer, and W. A. Weyl.

Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N.Y. 660 pages. Price $9.50.

A result of a symposium held at Cornell University concerning fundamental phenomena accompanying phase changes, this book is a compilation of the papers presented at the forum together with the discussions of them. Three main groups of papers are included in the 17 chapters: a theoretical-physical group, a group dealing with non-metals, and a group dealing with metals.

"An Introduction to the Chemistry of the Silicones," by Eugene G. Rochow

Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York, 16, N.Y. 213 pages. Price $5.

The marked industrial success of silicones has made it necessary to expand this second edition to include most of the recent theory and applications. New chapters cover the carbon-silicon bond, synthesis of organosilicon compounds, the physical chemistry of silicones, and a greatly enlarged table of physical properties of organosilicon compounds with reference to the original work on each compound. The introductory chapters review the silanes and their derivatives; later chapters emphasize the silicon polymers that have achieved commercial importance and give methods for their preparation, chemical and physical properties, and possible uses, together with large-scale production processes. A review of various methods of silicone chemistry analysis is also included.

"The Surface Chemistry of Solids," by S. J. Gregg

Published by Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N.Y. 297 pages. Price $8.50.

Various branches of the surface chemistry of solids are systematically surveyed in this book. General emphasis is on basic principles in an effort to simplify this complex subject for students not intimately acquainted with physical chemistry. Covered are all those chemical and physico-chemical phenomena which relate to the activity of the surface of a solid, or to the interface between a solid and a gas, a liquid or another solid, such as the adsorption of gases and vapors, the spreading of a liquid over a solid, catalysis, and adhesion. Theories of leading workers in these fields are summarized and evaluated in the book.

Selling to GM—Aimed at improving contact between General Motors and its many small suppliers, this booklet serves as a directory of the company's various purchasing departments. Each of the 39 manufacturing divisions is listed, together with the civilian and defense products made by each. As a further aid to prospective suppliers, the policies followed by General Motors with respect to defense contracts are outlined. *General Motors Corp., Broadway at 57th St., New York 19, N. Y.*

Drum cleaning—A new method for cleaning drums by throwing metallic abrasives under centrifugal force against their surfaces is described in this 6-page, two-color brochure. Photographs, line drawings, plan and

elevation drawings, and engineering specifications give all information as to operation and upkeep. *Pangborn Corp., Hagerstown, Md.*

Synthetic urea—The Pechiney process for the manufacture of urea is reported on in this 10-page pamphlet. By offering a high purity urea and at the same time keeping down maintenance charges due to corrosion by carrying out most of the processing steps at relatively low temperatures and pressures, the system is described as a notable advance in the economical production of urea. The pamphlet also surveys the properties and the developments of urea, and includes reports on the growth of urea as a fertilizer, as a protein builder when fed to animals, and as a component of urea formaldehyde plastics and adhesives. *Foster Wheeler Corp., 165 Broadway, New York 6, N. Y.*

Inventory control system (Pamph. SN 774)—Use of visible signals and files as an aid to management is detailed in this pamphlet by relating the history of one company's savings in time as well as costs after it had installed an activated inventory control system. Posting time and unnecessary duplication were eliminated by the combining of all essential records into one unit. *Management Controls Div., Remington Rand, 315 Fourth Ave., New York 10, N. Y.*

NEMA standards for laminated plastics—Information concerning the manufacture, test, and performance of laminated thermosetting sheets, rods, and tubes is covered in this new publication. Specifically, the publication describes the grades and presents the standards for form, color, finish, thickness, diameter, length, width, flexural strength, dissipation factor, impact and bonding strength, water absorption, arc resistance, and other properties. Typical values for physical and electrical properties are also listed and data are given on paper, fabric, asbestos, glass, and nylon base grades, including three grades of engraving stock. The publication may be obtained for $1.00 from *National Electrical Mfrs. Assoc., 155 East 44 St., New York 17, N. Y.*

S.P.I. Technical Session—The proceedings of the Sixth Annual Technical Session of S.P.I. is now available in a 225-page illustrated publication. Included are copies of reports covering such diversified topics as: the variables in molding glass fiber preforms; basic mold design; bulk fillers; merits of the reinforced glass fiber bread tray; design and development of reinforced plastics; reinforced plastics in naval aircraft, ships, army engineer research, and aircraft applications; and fibrous glass polyester laminates having high resistance to moisture. There is also a section devoted to the report of the standards committee and to new developments in the field of resins. The forums of questions and answers which followed the presentation of each report are outlined. Other topics covered are: machining and finishing of reinforced plastics parts; industrial hygiene considerations in the manufacture of reinforced plastics; design and fabrication of glass reinforced helicopter main rotor blades; and a survey of the reinforced plastics industry as it is now in Canada. A limited number of copies of the publication are available for $2.00 from *Society of the Plastics Industry, Inc., 67 West 44 St., New York, N. Y.*

Boiler valves (Bull. E125)—Various types of valves available for boiler services are described and illustrated. Complete specifications, materials of construction, and dimensions are given for each of the company's valves. The illustrations include details of design, sectional and exploded views, and explanations of operation. There is also a section devoted to describing fire protection valves. *Everlasting Valve Co., Dept. 76, 49 Fisk St., Jersey City 5, N. J.*

Laboratory service center—Attractively printed in two colors, this 16-page booklet presents photographs and text description of the new Washington Plant of the company. The emphasis is placed on the facilities which have been built into the plant for the fast and convenient handling of orders. *Fisher Scientific Co., 7722 Woodbury Drive, Silver Spring, Md.*

Monoglycerides—The growing use of monoglycerides of the fatty acids—such as stearic, oleic, lauric, and ricinoleic—in industry is discussed in this reprint. Methods of manufacture plus the varying compositions and physical properties possible are outlined. A specifications chart is also included. The industries discussed range from plastics, food, and drug to polish, insecticide, and photographic. *Glyco Products Co., Inc., 26 Court St., B'klyn 2, N. Y.*

Chemical industry in Mexico—The house organ "Polaquimias," of Dr. Jose Polak, S. A., Chemical Engineers and Consultants, is now available in an English edition. The purpose is to supply information on any Mexican developments affecting the use of chemical products for industrial, agricultural, and mining enterprises. *Polaquimias, Edificio Polaquimia, Mexico 4, D.F.*

Pittsburgh chemicals — Breaking down five of its divisions into the principal products each one offers, this 12-page company bulletin summarizes the important individual uses and applications. Diagonal illustrations showing the chemicals as employed in industry are included and, whenever possible, specifications are given. The five sections covered are coal chemicals, plasticizers, activated carbons, protective coatings, and agricultural chemicals. *Pittsburgh Coke and Chemical Co., Grant Bldg., Pittsburgh 19, Pa.*

Shell-molding—The entire process of shell-molding is thoroughly explained in this 8-page illustrated booklet which makes good use of simplified diagrams. Also covered are a history of the process, its advantages, the materials and equipment needed in production, and the necessary information for successful upkeep. A table is included for guidance in determining the forming and curing cycles. *The Borden Co., Chemical Div., 350 Madison Ave., New York 17, N. Y.*

Precision files—This 8-page catalog, with illustrations and descriptions, covers diemaker files, machine files, needle files, and riffler files. *The DoALL Company, Des Plaines, Ill.*

Improving lighting for industry—The first in a series called "See Better—Work Better," this bulletin offers information on new ideas in plant lighting, complete with illustrations and diagrams. Also available

is a 48-page handbook, "Planned Lighting for Industry" which analyzes the requirements of lighting and shows actual samples of new systems for better seeing conditions installed by leading plants. *General Electric Co., Nela Park, Cleveland, Ohio.*

Pyrometer supplies—Technical data on the application and use of thermocouple pyrometic supplies are included with this 40-page buyer's guide which lists a complete line, basic prices, and standard ordering procedures. Each product is illustrated with an enlarged view of its assembly and is listed under one of the five separate sections: base and noble metal thermocouple assemblies; special purpose thermocouples; replacement elements; and components. *Minneapolis-Honeywell Regulator Co., Industrial Div., Wayne and Windrim Aves., Philadelphia, Pa.*

Facts about plastics—Designed to give the layman a basic introduction to the plastics industry, this 24-page booklet offers a complete outline in clear, non-technical language of the manufacture, forms, uses, and the design possibilities of plastics. Simplified drawings and illustrations aid in a better understanding. Topics covered are: advantages of plastics; thermosetting and thermoplastics; laminated plastics; custom molders; industrial and consumer applications; molding; and design. *The Richardson Co., Melrose Park, Ill.*

Testing instruments—As an aid to comparing and verifying the physical properties of manufactured or fabricated materials, the instruments listed in this illustrated pamphlet cover a variety of applications. Data are given on equipment for determining bursting pressures, bulking, or thickness, and for obtaining basis weights. *E. J. Cady & Co., 134 N. La Salle St., Chicago, Ill.*

Spray painting—Nearly 100 photographs have been assembled in this 16-page brochure to graphically illustrate the many uses of spray equipment now in operation. Actual scenes of the machines in action were taken at industrial plants, on farms, in shipyards, and wherever else spray painting is practiced. A special feature shows the company's new research center and school where all sorts of finishing problems are handled. *Spray Painting Equipment Div., DeVilbiss Co., Toledo, Ohio.*

Protective linings—Alkalies, dilute mineral acids, chlorinated solvents, detergents, and other chemical products can now be successfully shipped in steel containers with the new epoxy resin protective coating-liner described in this leaflet. Called "Synthetasine 100," this lining is claimed to be as effective in resisting the normal abuses of shipping as it is in withstanding chemical action. Its application, curing schedule, and the results of actual tests on the product are also covered in the leaflet. *Synthetasin Protective Coatings, Inc., 600 Fifth Ave., New York 20, N. Y.*

Polyethylene—The many uses and advantages of the various grades of Agilene polyethylene are outlined in this circular. Products made of Agilene are illustrated and described in detail, as are the chemical make-up and physical properties of the material itself. *American Agile Corp., Plastics Div., 5806 Hough Ave., Cleveland 3, Ohio.*

Company organization—In celebration of its fiftieth anniversary, this company has issued a 42-page booklet, highlighting its past and its position in the industry today. Of particular interest are the sections describing various production problems arising over the years, and the methods developed in their solution. *United Eng. and Foundry Co., 948 Duquesne Way, Pittsburgh, Pa.*

Plexiglas handbook for aircraft engineers—A 66-page manual covers in detail the use of Plexiglas for transparent enclosures on aircraft. The handbook treats four main subjects: types of Plexiglas sheet for aircraft use; physical and chemical properties; design considerations; and methods of installation. Considerable emphasis is placed on design which includes much data presented for the first time. *Rohm & Haas Co., Plastics Dept., Washington Sq., Philadelphia 5, Pa.*

Certified magnetic separation (Cat. No. C-5000-B)—The company's entire line of magnetic separators and lifting magnets is described in this 12-page bulletin, which explains which magnets to use for removing iron from wet or dry materials carried on conveyor belts, as well as from chutes, ducts, and so forth. Units for magnetic concentration and purification, heavy media recovery, and materials handling are also discussed. *Dings Magnetic Separator Co., 4740 W. Electric Ave., Milwaukee 46, Wis.*

Tenite folder—Available to industrial designers only, this folder contains reference data about new uses for cellulose acetate and cellulose acetate butyrate molding and extrusion materials. These new applications include knife handles, a clothes drying rack, a plant protector, furniture knobs. an electric fence gate, a football helmet, a fuse puller, etc. Assembly operations of each application and the particular properties of acetate and butyrate that are utilized in each end use are discussed. All of the applications are accompanied by photographic descriptions. *Tennessee Eastman Co., Kingsport, Tenn.*

Melamine-surfaced furniture—Newest developments and applications of furniture surfaced with decorative melamine laminates are described in this 25-page booklet. The advantages of the laminates and the wide range of tones, textures, and grain effects available are thoroughly covered. Included is a list of manufacturers and retailers, giving the address of each. *Plastics Div., Monsanto Chemical Co., Springfield, Mass.*

Pigments—An up-to-date chart has been issued on Violite phosphorescent and fluorescent pigments. This chart contains such data as colors, afterglow, fluorescence, specific gravity, particular properties, and suggestions for applications. *Rhode Island Laboratories, Inc., West Warwick, R. I.*

Abrasive-belt machines—Descriptions of the company's abrasive-belt machines are contained in this 28-page booklet. For each machine, a list of specifications, standard equipment, drive unit, and accessories is given, together with its operation and the scope of its uses. *The Porter-Cable Machine Co., 3160 N. Salina St., Syracuse 8, N.Y.*

Find the Answers to Your Corrosion Problems

LUCOFLEX

rigid vinyl and Lucanol coatings

Resists most acids, alkalies.
Excellent electrical characteristics.
High softening point - 170°F.
Formable! Moldable! Extrudable!

Corrosion-resistant 5-gallon container for concentrated sulphuric acid is made entirely of Lucoflex sheet and tubing. Constructed solely with ordinary fabricating techniques and equipment.

The unusual unplasticized rigid polyvinyl chloride material called Lucoflex has outstanding chemical, physical and thermal properties which frequently can help you solve many problems at lower cost than ever before.

Lucanol rigid vinyl coatings are identical in properties with Lucoflex and can be brushed or sprayed on. Require no baking. All colors.

Current applications for Lucoflex and Lucanol range from chemical hardware, hoods and production equipment which resist the corrosive action of acids, bases, mineral salts and many organic solvents to large topographic maps which are drawn from sheet stock with extreme accuracy.

Lucoflex articles can be made by calendering, extruding, transfer molding and vacuum forming. It may also be fabricated by sawing, welding, machining and other standard techniques used for manufacturing plastics. The material, which is not waxy, is available as molding compound, sheets, rods and tubes.

An interesting booklet has been prepared, containing technical data on the properties of Lucoflex and listing suggested uses. For a copy write to American Lucoflex, Inc., 1 East 57th Street, New York 22, N. Y.

Lucoflex

Production of

FOR the purpose of this report, production is the sum of the quantities of materials produced for consumption in the producing plant for transfer to other plants

PLASTICS AND SYNTHETIC RESIN PRODUCTION
From Statistics Compiled

Materials	*Total p'd'n. first 8 mos. 1951*	*Total sales first 8 mos. 1951*
CELLULOSE PLASTICS:[a]		
Cellulose acetate and mixed ester plastics:		
Sheets, under 0.003 gage	11,178,343	11,136,566
0.003 gage and over	8,186,861	8,053,490
All other sheets, rods and tubes	4,213,477	4,030,542
Molding, extrusion materials	49,153,312	46,922,447
Nitrocellulose:		
Sheets	4,770,003	4,011,993
Rods and tubes	772,020	839,084
Other cellulose plastics[b]	8,664,930	8,400,944
PHENOLIC AND OTHER TAR ACID RESINS:		
Laminating	53,684,873	36,918,151
Adhesive	50,026,691	26,545,437
Molding and casting materials[a]	158,261,277	140,521,570
Protective coatings (unmodified and modified except by rosin)	19,559,925	14,672,106
Miscellaneous uses	51,067,943	48,999,582
UREA AND MELAMINE RESINS:		
Adhesives	57,920,106	54,505,467
Textile-treating resins	53,750,901	50,241,964
Paper-treating resins	10,684,139	10,158,376
Protective coatings, modified and unmodified	19,008,538	13,319,427
Miscellaneous uses, including laminating and molding[c]	60,071,660	52,658,828
STYRENE RESINS:		
Molding materials[a]	174,736,871	166,380,582
Protective coatings, modified and unmodified	29,440,252	28,065,396
Miscellaneous uses	39,355,929	33,884,036
VINYL RESINS:[d] total	300,834,651	279,709,393
Sheeting and film (resin content)[e]		112,437,887
Adhesives (resin content)		9,600,189
Textile and paper-treating resins (resin content)[f]		30,397,066
Molding and extrusion materials (resin content)		94,166,072
Protective coatings (resin content)		17,336,586
Miscellaneous uses (resin content)		15,736,593
COUMARONE-INDENE AND PETROLEUM POLYMER RESINS:	112,123,709	111,126,505
MISCELLANEOUS SYNTHETIC PLASTICS AND RESIN MATERIALS:		
Molding materials[a, g]	51,637,466	46,339,465
Protective coatings[h]	12,049,224	13,600,420
All other uses[i]	68,795,389	64,938,988

* Dry basis unless otherwise specified. † Revised. [a] Includes fillers, plasticizers, and extenders. [b] Includes sheets, rods, and tubes, and molding and extrusion materials. [c] Data on resins for laminating and miscellaneous uses are on a dry basis; data on molding materials are on the basis of total weight. [d] Production statistics by uses are not representative, as end-use may not be known at the time of manufacture. Therefore, only statistics on total produc-

Plastics Materials

of the same company, and for sale. Sales include only the quantities involved in bona fide sales in which title passes to the purchaser.

IN POUNDS* FOR JULY AND AUGUST, [illegible] by U. S. Tariff Commission

July 1951		*August 1951*	
Production	*Sales*	*Production*	*Sales*
1,625,021	1,618,717	1,406,973	1,380,721
989,532	958,473	877,315	814,539
447,337	460,463	414,444	384,366
5,766,292	5,733,425	5,204,253	5,117,025
427,963	341,559	542,655	428,941
80,184	83,541	102,487	120,973
801,430	964,885	1,153,138	896,608
5,295,495	3,475,726	5,929,167	3,860,870
3,252,878	2,848,327	4,313,602	3,850,824
19,070,773	15,876,020	16,697,672	15,778,443
2,521,600	1,904,371	2,524,663	1,991,109
6,052,034	5,254,041	5,536,636	5,443,300
5,266,046	4,966,559	5,808,930	5,805,986
1,458,597	1,513,480	1,639,725	1,542,483
888,568	1,102,621†	1,580,314	1,390,127
1,162,262	912,427	1,632,325	1,136,216
6,209,730	5,364,738	7,189,355	6,162,201
25,689,129	23,731,005	26,566,966	24,167,725
3,971,292	3,794,225	3,647,791	3,531,994
4,802,856	3,969,010	5,712,356	4,200,627
39,531,024	35,463,554	37,746,953	34,150,170
	14,080,646		12,518,657
	1,681,233		1,314,940
	3,852,013		4,033,861
	11,495,969		11,873,703
	1,774,392		2,025,154
	2,579,301		2,383,855
12,876,428†	12,780,997†	12,769,922	12,521,489
5,517,213	5,049,892	7,505,437	6,410,765
1,390,128†	1,455,075†	1,491,749	1,428,384
7,005,777†	6,354,131†	7,524,185	6,986,432

tion are given. • Prior to January 1951, statistics were given on the basis of total weight. ‡ Includes data for spreader and calendering-type resins. § Includes data for acrylic, polyethylene, nylon, and others. ¶ Includes data for epichlorohydrin, acrylic, polyester, silicone, and other protective coating resins. † Includes data for acrylic, rosin modifications, nylon, silicone, and other plastics and resins for miscellaneous uses.

Shower Doors

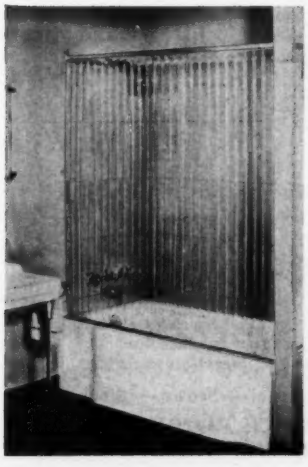
TWO transparent Plexiglas acrylic panels molded with vertical corrugations form the sliding doors of an enclosure for recessed bathtubs. The panels are strong but light in weight, and lend a trim, tailored appearance to the bathroom.

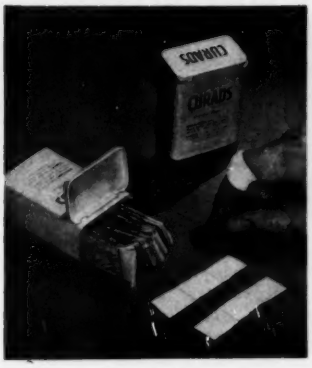
The panels slide easily in a metal track cemented to the upper rim of the tub. There are no moving rollers in the track. Drainage ports spaced along the inside edge of the track prevent flooding when the shower is used. The top of each panel is held in place by a slotted head rail which is fastened to the side walls with die-cast aluminum wall brackets. The molded-in corrugations do not extend the full length of the doors; flat areas are left at top and bottom to slide in the track and head-rail slot. Handles for moving each panel are molded-in.

Each panel is 0.100 in. thick, about 34 in. wide and 60 in. high, and a pair will fit any recess from 56 to 62 in. long. The acrylic enclosure can be installed at a price well below that of a glass enclosure.

Called the Cascade, the enclosures are manufactured by Fiat Metal Mfg. Co., Long Island City, N.Y., from acrylic sheet supplied by Rohm & Haas Co., Philadelphia, Pa. They are available as packaged units in crystal clear, gold, or pink.

Sliding panels of acrylic sheet make attractive, sturdy shower enclosure





Flexible new vinyl-backed bandage conforms to movements of the human skin

Vinyl Bandages

FIRST vinyl-backed sterilized bandages available to the public in drug store surgical supplies are Curads, a product of Bauer & Black, Chicago, Ill. Principal improvement of the new adhesive dressing over conventional adhesive tape and adhesive bandages is that, because of the flexibility of the vinyl, it conforms to the movement and distortion of the human skin. In addition, the dressing is completely waterproof and soil-resistant, and can be cleansed with soap and water. It was developed for home and industrial first aid use—protection and treatment of minor cuts, sores, bruises, and infections.

The vinyl backing—cast film 3½ mils thick—was developed especially for this application. After investigating hundreds of materials, Bauer & Black found that vinyl was the only one with physical properties directly comparable to those of the human skin—both are flexible, strong, and stretch in any direction. Thus, when the vinyl dressing is applied to the skin, no area or joints are immobilized.

Thinness of the vinyl backing also contributes to the flexibility of the bandage. It can be worn under a tight glove, and remains in snug contact over a wound for many days.

The adhesive used on Curads is a rubber base pressure sensitive type specially formulated for use on surgical supplies.

Johnson & Johnson, New Brunswick, N. J., are also working on a similar type vinyl-backed dressing.

Polyethylene Pump for Acids

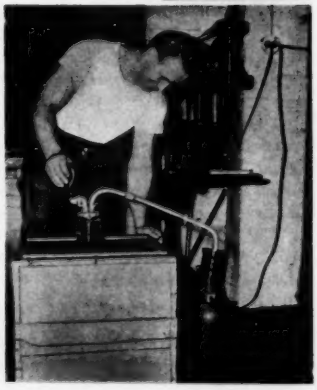
TWO applications of polyethylene tubing—a safety air vent with spout and a pneumatic acid pump—provide safety and ease in pouring acids from carboys and barrels. Success of the applications is due to the material's flexibility, durability, and excellent resistance to most common acids and volatile liquids. Both devices are made by Thompson Mfg. Co., Erie, Pa., with polyethylene from the Bakelite Co.

The safety air vent and spout delivers acids in a steady, even flow without spurts or splashes at a flow capacity as high as five gal. per minute. Extensions to spout are made using flexible polyethylene tubing with threaded ends and joints.

Operating at floor level, the pneumatic acid pump eliminates lifting or tilting heavy drums or carboys. By pressing a bulb on top of the pump, air is forced into the container; the air in turn sends a smooth stream of liquid out of the spout at a rate of approximately two gal. per minute. Pressing up on the air relief valve stops the flow instantly. The pump, which is transferable from one container to another, prevents dangerous air pressure from generating inside glass containers.

Photos courtesy Bakelite Co.

Polyethylene pump (below) transfers acid from one container to another. Safety air vent spout can be extended by screwing on extra tubing (right)



HELPFUL FREE LITERATURE

EQUIPMENT • SUPPLIES • SERVICE

The literature and samples described here contain valuable data that will help increase the operating efficiency of your business.

After selecting the items you want, merely circle the corresponding numbers on the post card, fill in the information requested, and mail.

VINYL PLASTICIZER. Booklet discusses physical properties, plasticizing properties, test results, compositions, suggested formulations, stabilization, and other data about MPS-500, a new, low-cost plasticizer. Hooker Electrochemical Co. (C-50)

"POWR-SAVR" PUMPS. Folder describes and illustrates the features and advantages of Aldrich-Groff controllable capacity "Powr-Savr" pumps for applications where full variable control of pressure or discharge is required. The Aldrich Pump Co. (C-51)

THICKNESS GAGES. Applications and operating principles of Beta gages for measuring thicknesses or variations in thicknesses of sheet materials without actually touching them. Tracerlab Inc. (C-52)

"CONTRACOATER." Bulletin describes an advanced design machine for reverse roll coating of web materials. Dilts Machine Works, Div. of The Black-Clawson Co. (C-53)

MOLDING FACILITIES. Custom molder's services described from design of product to finished molded parts. Erie Resistor Corp. (C-54)

DRY COLORING. Bulletin recommends percentages of dry color to be used to achieve dark or transparent pastel colors when dry coloring cellulose acetate and cellulose acetate butyrate. Compares Ferro colors with standard polystyrene colors. Ferro Corp. (C-55)

M.P.C. FACILITIES. Booklet explains the facilities available for custom compression molding and other supplementary activities at Molded Products Corp. (C-56)

TUMBLING PLASTICS. Magazine reprint explains how barrel tumbling facilitates the cleaning and polishing of small, intricate plastic parts. Tumb-L-Matic, Inc. (C-57)

ROTARY CHOPPING MACHINE. Bulletin gives information on the operation and applications of the Cumberland rotary chopping machine. Cumberland Engineering Co., Inc. (C-58)

SHELL-MOLDING PROCESS. Booklet describes the development of the Shell-Molding Process or "C" Process and summarizes the advantages and best accepted techniques of its use. Lists equipment and design considerations. The Borden Co. (C-59)

BOOSTERS AND ACCUMULATORS. Complete engineering, installation, mounting, and operation data on fluid pressure boosters and accumulators. Includes charts, illustrations, and diagrams. Miller Motor Co. (C-60)

CELLULOSE ACETATE SHEETS. Catalogue insert explains the manufacture and typical applications of Monsanto's Fibestos cellulose acetate sheet. Tells methods of fabrication and lists standard sheet sizes and gage tolerances. Monsanto Chemical Co. (C-61)

MOLDS AND DIES. The services offered by The Parker Stamp Works in the manufacture of all types of plastic molds and die casting dies are covered in this folder. The Parker Stamp Works, Inc. (C-62)

SCALE CATALOGUE. Catalogue describes the complete line of Toledo Industrial Scales for weighing everything from a fraction of a gram to many tons. Includes scales for counting, balancing, computing, weight-printing, batching, packing, and other highly specialized applications. Toledo Scale Co. (C-63)

SCRAP GRANULATOR. Bulletin describing the Van Dorn scrap granulator for rigid thermoplastic scrap. Features, specifications, and illustrations are included. The Van Dorn Iron Works Co. (C-64)

FABRICATED POLYETHYLENE. Folder describes and illustrates the various chemically and electrically resistant containers, valves, plating baskets, tank liners and other products which can be custom fabricated of Agilene polyethylene resins. American Agile Corp. (C-65)

PLASTICS GRINDER. Data on the American "KC" rotary knife grinder for reducing sprues, gates, rejects, and other thermoplastic scrap to homogenous granules. American Pulverizer Co. (C-66)

CONTINUOUS EXTRUSION TAKE-UP EQUIPMENT. Brochure illustrates and explains the advantages of 101 tensioning and capstan units for take-up of wire, cable, monofilaments, tubing, and other flexible extrusions. Industrial Ovens, Inc. (C-67)

TEMPERATURE MEASURING EQUIPMENT. Bulletin on Thermo Electric indicating and controlling pyrometers, thermocouples, connectors, etc. which are used in measuring and controlling the heat of various machines. Thermo Electric Co., Inc. (C-68)

DURAPLEX A-29. Physical constants, properties, and formulations for Duraplex A-29, a resin of high alkyd content used in baking enamels where it is converted at low baking temperatures. Rohm & Haas Co. (C-69)

VINYLITE PLASTICS RIGID SHEETS. Technical data on machining, forming, cementing, and finishing are presented in this pamphlet. Bakelite Co., Div. of Union Carbide and Carbon Corp. (C-70)

CONTINUOUS ROLL FEEDS. Bulletin describes a machine for maintaining full speed production on all roll fed machines while new rolls are sewed on. Mount Hope Machinery Co. (C-71)

ELECTRONIC WOOD GLUING. Information about Thermatron electronic heating equipment for high-speed drying of glues and for facilitating wood bending. Thermatron Div., Radio Receptor Co., Inc. (C-72)

Fill out and mail this card now

MODERN PLASTICS

Manufacturers' Literature Service

I am interested in the following items:

C-50	C-51	C-52	C-53	C-54	C-55	C-56	C-57	C-58	C-59	C-60
C-61	C-62	C-63	C-64	C-65	C-66	C-67	C-68	C-69	C-70	C-71
C-72	C-73	C-74	C-75	C-76	C-77	C-78	C-79	C-80	C-81	C-82
C-83	C-84	C-85	C-86	C-87	C-88	C-89	C-90	C-91	C-92	C-93

If you do not now subscribe to MODERN PLASTICS, but wish to receive the next 12 issues ($5 everywhere), just check here ☐

NAME ..... **POSITION** .....

(Please Print Plainly)

COMPANY .....

STREET ..... **CITY** ..... **STATE** .....

(Not Valid After March 1, 1952)

HELPFUL FREE LITERATURE

EQUIPMENT • SUPPLIES • SERVICE

The literature and samples described here contain valuable data that will help increase the operating efficiency of your business.

After selecting the items you want, merely circle the corresponding numbers on the post card, fill in the information requested, and mail.

ETHOXYLINE RESINS. Description of Araldite ethoxyline resins which harden practically without evolution of water or volatile matter to form corrosion-resistant adhesives for metals, ceramics, and other materials. Ciba Co., Inc. **(C-73)**

INJECTION MACHINE. Descriptive folder on the 4-oz. Lewis injection machine for molding pieces with large projected areas. Lewis Welding and Engineering Corp. **(C-74)**

RESIN IMPREGNATED PAPER. Technical test reports on papers impregnated with Chemigum Latex 245B for improving certain physical properties and increasing oil resistance. The Goodyear Tire & Rubber Co., Inc. **(C-75)**

BANBURY MIXERS. Booklet containing general descriptive material on Banbury mixers of all sizes. Includes table of capacities, cross section views, and layout drawings. Farrel-Birmingham Co., Inc. **(C-76)**

INJECTION MOLDING MACHINE. Folder describes the features and advantages and lists the specifications of a 20-oz. capacity injection molding machine with automatic time-cycle control. R. H. Windsor Ltd. **(C-77)**

SURFACE PYROMETERS. Described are various standard, combination, and special models of Cambridge pyrometers. Price list included. Cambridge Instrument Co., Inc. **(C-78)**

ORGANIC PEROXIDES. Table describes the various organic peroxides available from Lucidol. Trade names, formulas, assays, and active oxygen contents are given. Lucidol Div., Novadel-Agene Corp. **(C-79)**

HEATING APPLICATIONS. Bulletin describes some interesting recent applications of Chromalox electric heating elements. Edwin L. Wiegand Co. **(C-80)**

PLASTIC EXTRUDER. Leaflet contains specification data on electrically heated 1½-in. plastic extruder manufactured by Francis Shaw & Co., Ltd. **(C-81)**

MOLD STEEL. Description of Carpenter Samson Extra—case-hardening alloy mold steel for hobbed and machined molds and forces. Includes advantages, information on carburizing, hardening, etc. The Carpenter Steel Co. **(C-82)**

POLYFILM. Question and answer folder explains the types and grades available, and the advantages of Polyfilm, the polyethylene film manufactured by Extruders, Inc. **(C-83)**

UNIVERSAL TESTING MACHINES. Folder contains information on table model universal testing machines for volume production testing or laboratory research work. Machine tests tension, compression, flexure, shear. National Forge & Ordnance Co. **(C-84)**

CELLULOSE ACETATE PLASTICIZER. Technical information bulletin on "Flexol" plasticizer 3CF—an effective plasticizer for cellulose acetate, mixed cellulose esters, and ethyl cellulose. Carbide and Carbon Chemicals Corp., Div. of Union Carbide and Carbon Corp. **(C-85)**

PANTOGRAPH ENGRAVER. Illustrated booklet fully describes various models of the New Hermes Engravograph for precision engraving on plastics and metal. New Hermes, Inc. **(C-86)**

INDUCTION HEATING OF MOLDS. Leaflet explains how induction heating improves heat distribution in plastic molds and discusses how induction heating betters heat control. B.I.P. Tools Ltd. **(C-87)**

MARKING. Broadside featuring questions and answers about the Peerless process of roll leaf stamping. Illustrates and describes various types of presses used for this process. Peerless Roll Leaf Co., Inc. **(C-88)**

"TEXTOLITE" PLASTICS SURFACING. Four-color booklet shows a number of applications of Textolite plastic surfacing in homes and industry. Illustrates various colors and patterns which are available. Explains details of installation. General Electric Co. **(C-89)**

UTILITY ENGRAVER. Booklet on the Panto heavy-duty bench-type engraver for engraving plastics, metals, etc. Contains type samples and illustrations of supplementary equipment. H. P. Preis Engraving Machine Co. **(C-90)**

INKING ROLLS. Features, advantages and illustrations of the Evenflo engraved inking rolls for better printing. Paper Machinery & Research, Inc. **(C-91)**

SOLKA-FLOC. Bulletin discusses miscellaneous and general uses of Solka-Floc, which is pure, finely divided wood cellulose fibres. Brown Co. **(C-92)**

COMPRESSION MOLDING EQUIPMENT. Folder shows the range of preforming machines, compression presses, platen presses, heating platens, and hobbing presses manufactured by T. H. & J. Daniels Ltd. **(C-93)**

Fill out and mail this card now

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

First Class Permit No. 2656 (Sec. 34.9, P.L. & R.), New York, N.Y.

MODERN PLASTICS

575 Madison Avenue

NEW YORK 22, N. Y.

This One's On Us!

A CAPSULE philosophy of industrial public relations is found in the following quotation, often attributed to Henry Ford: "I don't mind people talking about me, just so long as they keep talking about me. It's when they stop that I begin to worry." Henry Ford had a good product. As the jokes, puns, and songs about the "flivver" gained popularity, the "flivvers" themselves gained popularity; people bought more and more of them.

The Plastics Industry, likewise, has good products. It, too, can profit by the publicity of humor, even when it's not too good. That is why we reprint, with the permission of the publishers, this copyrighted "poem" from *Punch* (England):

Deliver Us!

It's time that something drastic
Was done about Plastic.

It serves as adjective or noun, just as you wish,
Like a verbal blancmange that's flopped from any old dish;
It has all colours, every one of them shiny,
It may be tremendous, it may be tiny;
The stuff takes any shape
With the senseless imitation of the ape;
We may wear it or eat upon it,
Play with it, take a seat upon it;
With hot things it is hot,
With cold things, not.
It can flap upon occasion like cloth,
But it denies food to the moth;
It can even look like lace,
Boiled hard, devoid of grace.
It cuts like inferior steel,
Or turns when shaped like a wheel.
You can make it whistle, as a recorder;
It will twang to order.
It may be sawn or moulded,
Snipped, nailed, glued, sand-papered or folded.
It is gymnastic, elastic;
It is Plastic.

A mountain near Interlaken grew me a wooden bowl;
I have a glass with bubbles in it from Sweden;
My shirt dreams of Sea Island waters that roll;
This basket was woven by gipsies at the foot of Bredon.
But plastic suspenders are brought to birth
Everywhere on earth,
And anyone can have them for me.
They were made from milk, or coal, or a tree.
I wouldn't buy even a plastic fresco
Commemorating UNESCO.

I knew a man who bought a plastic pen.
And when
I saw it I said "Throw it away, throw it away!"
But it cost him two pounds seven—he let it stay.
He clipped it next to his heart every day;
It was always there, in his joy or his labour,
And now he is exactly like his neighbour.
His politics are those of his papers,
He cuts no individualistic capers;
His jaw never clenches; his dull eyes never roll;
His views on all subjects are those of the Gallup Poll . . .

The Plastic has entered into his soul.

Gauze Dispenser

A MOLDED styrene dispenser for sterile gauze pads was recently introduced to the drug trade by Johnson & Johnson. The unit, which holds 50 three-in. sq. sterile pads, is entirely enclosed to insure sanitary protection. Pads are dispensed one at a time through a slot in the lower front of the unit.

The dispenser is produced in a two-cavity die, one cavity for each half of the unit. The two parts are joined by a simple assembly. Two round lugs protruding from the sides of the front half are engaged in two corresponding holes in the back half. These holes are jig drilled two at a time. The two halves are held together in the closed position by a friction fit at the top of the dispenser. This hinge arrangement permits easy loading of pads.

Two thin ribs which are molded-in to the base of the dispenser serve as a support for the stack of gauze pads.

The unit, which measures 7½ by 3⅞ by 4 in., is molded by Auburn Button Works, Inc., Auburn, N.Y., from material supplied by Bakelite Co. and The Dow Chemical Co. Machine cycle is 33 seconds. The unit, which was styled by Egmont Arens, is molded in white with red hot-stamped lettering.

The entire unit rests on four sponge rubber feet which grip even the most highly polished surfaces. This friction tends to overcome what otherwise might be a top heavy construction.

Styrene gauze dispenser is completely enclosed to insure sanitary protection

New England S. P. I. Conference

THE ANNUAL conference of the New England Section, The Society of the Plastics Industry, Inc., was held Wed. and Thurs., Oct. 10 and 11, at the Equinox House, Manchester, Vt. Attendance was heavy, as usual, and interest in current industry problems was the key.

Two conference sessions were held. The Wednesday session was presided over by Robert F. Howe, E. B. Kingman Co. George V. Sammet, Jr., Executive Vice-President, Northern Industrial Chemical Co., spoke on "Multiple Management in Plastic Molding," describing the system used in his organization for training junior executives, while at the same time increasing efficiency and improving morale. R. A. Hoffer, Manager of Engineering, Plastics Div., Chemical Dept., General Electric Co.. spoke on "Developing New Applications for Plastics," and used as illustrations actual examples of redesigned products in which plastics superseded other materials.

The current status of O.P.A. regulations as they relate to the plastics industry was discussed by Robert E. Bell, Chief, Plastics, Toys and Miscellaneous Sec., Consumer Durable Goods, O.P.S.

At the annual banquet Wednesday, Oct. 10, George V. Sammet, Jr., Chairman of the New England Section of S.P.I., was toastmaster. S.P.I. President Gordon Brown spoke on the current year's activities in S.P.I.

At the Thursday session, F. Reed Estabrook, Jr., presided. Frank X. Kiefer, Editor, *Department Store Economist,* discussed "Merchandising Plastics in Retail Stores," giving case histories of successful plastics product promotions at retail level. George H. Sollenberger, Chief, Thermoplastics Unit, Plastics Sec., Chemical Div., Dept. of Commerce, N.P.A., reported on N.P.A. functions as they affect the plastics industry today. Professor Albert G. H. Ditz of the Mass. Institute of Technology presented an illustrated lecture, "Japan—Six Years After."

The informal golf dinner held the evening of October 11 was presided over by Prescott F. Huidekoper, Plaskon Div., Libbey-Owens-Ford Glass Co.

Custom-made for Plastics

Calco Ultramarine Blues

You have a choice of a complete range of blues from the green cobalt shade to the reddest shade—unmatched in their brilliance and effect by any other colorant or combination of colorants of corresponding properties.

The characteristic fine particle size of Calco Ultramarine Blues permits maximum dispersion throughout the plastic mass with minimum processing.

Calco Ultramarine Blues command wide acceptance for their outstanding properties—non-bleeding, excellent heat and light stability, close control of shade and strength, maintained to meet the exacting demands of the plastics industry.

Our Technical Service Staff, with the facilities of its full-time plastics research laboratory, helps to maintain and improve the quality of your plastics products.

Calco Products for the Plastics Industry

Pigments
- Ultramarines
- Cadmiums
- Chrome Yellows, Oranges and Greens
- Phthalocyanine Blues and Greens
- Iron Blues
- Organic Toners and Lakes

UNITANE® (Titanium Dioxide)
- Anatase and Rutile Types

Dyes
- Oil Soluble Dyes
- Spirit Soluble Dyes
- Nigrosines
- Specialties

Calco®

AMERICAN Cyanamid COMPANY

CALCO CHEMICAL DIVISION. DYESTUFF DEPARTMENT
BOUND BROOK. NEW JERSEY

Represented in Canada by
North American Cyanamid Limited, Calco Chemical Division
Victoria and Bute, St. Lambert, Montreal 23, Quebec.
Royal Bank Building, Toronto 1, Ontario.

Fuse Holder

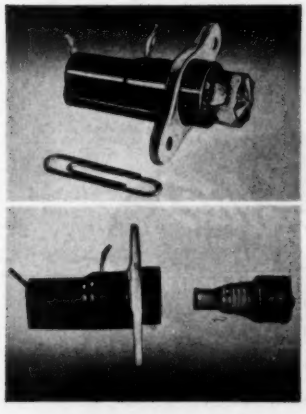
DEVELOPED on a government miniaturization contract and now available commercially, a new indicating fuse holder produced by Alden Products Co., Brockton, Mass., automatically spots a blown fuse. A neon bulb in the fuse holder starts to glow as soon as the fuse blows, thus giving an immediate indication of trouble.

The neon bulb is injection molded as an integral part of the crystal clear Tenite acetate lens. The base of the holder is compression molded of general-purpose phenolic.

Initially designed to fit radio production techniques where it is fastened to the chassis with eyelets, rivets, or spot welds, using the same tools as other components, the new unit overcomes objections to fuse holders which loosen when held by nuts or friction fasteners. Positive U-shaped contacts assure noiseless fused circuits.

Following are the safety features incorporated in the 440FH fuse: 1) an internal split ferrule that automatically opens and reengages threads on knob at 3 in.-lb. turning force, which assures controlled contact pressure; 2) ejector spring that facilitates fuse removal and assures even contact pressure with fuse length variations; and 3) U-shaped contacts that allow easy removal of fuse if it breaks from heat of blowing.

Miniature fuse holder (top) automatically spots blown fuse; ejector spring simplifies removal of the fuse (bottom)



MORE USES for remarkable U. S. Royalite

the Versatile Thermoplastic with 1,000 Applications

ROYALITE IN THE TOY INDUSTRY—Children are tough on toys—but Royalite can take it! For Royalite is the ideal material when abuse from active children is an important factor.

Warm and pleasant to the touch, it will *not* splinter, warp, or shatter. It has no dangerous, sharp edges. It is highly resistant to impact. Its colors are everlasting. And it can be formed on standard equipment with conventional techniques.

ROYALITE PONY TRICYCLE FIXTURES—This exciting, new, drawformed Royalite pony head and saddle add new glamour to children's tricycles. Developed in Royalite and fabricated by Regal Plastic Co., Kansas City Mo., for Texas Bronc Mfg. Co.

ROYALITE SHELL CHAIR—Fabricated by Lensol Wells Co., Los Angeles, Calif., this smart, unique chair proves Royalite's contribution to greater freedom of design. It was selected by The Museum of Modern Art for current showing at the "Good Design" exhibit in Chicago.

ROYALITE IN THE FURNITURE INDUSTRY—U. S. Royalite gives designers and engineers greater freedom of design than conventional materials—allows them to use flowing sweeps and curves.

In a rainbow of everlasting colors, lightweight, waterproof and stainproof, easy-to-clean Royalite is the perfect answer to numerous materials problems in the furniture field today. Royalite, although light, is remarkably tough and highly resistant to impact. Designed for complete pieces or decorative inlays, it is easily formed; remains non-warping, non-corrosive for life.

SEE NEXT PAGE FOR LIST OF U. S. ROYALITE FABRICATORS→

U.S. Royalite®
STANDARD OR FLAME RESISTANT

The engineering staff of United States Rubber Company will be glad to work with you or advise you on any application of Royalite you may suggest.

UNITED STATES RUBBER COMPANY
2638 NORTH PULASKI ROAD • CHICAGO 39, ILLINOIS

Plastisols

(*Continued from pp. 87-93*)

matic dishwashing machines made by at least three major appliance manufacturers. Such racks have less tendency to chip the dishes and cost less than stainless steel racks because the racks which are to be coated can be made of black iron.

Egg baskets, potato baskets, and other similar utility items for farm use are being coated with vinyl plastisol in the same manner as are dish drainers. Handles on various kinds of tools are also being dip coated for electrical insulation and to give them a softer, warmer feel. A number of companies are coating the tips of bobby pins so that women can open the pins with their teeth without danger of chipping or scratching their teeth.

Stainless steel nuts and bolts used in corrosive chemical baths are now being replaced by low carbon nuts and bolts coated with vinyl plastisol. The vinyl-encased nuts and bolts, made by Steere Enterprises, Akron, Ohio, cost about one seventh as much as stainless steel . . . and they resist corrosion better.

Bumpers on carts used in supermarkets are also being dip coated with vinyl plastisol. The ⅛-in. thick coating is applied without bonding to the metal by F. D. Pace Co. The resultant bumper has a better appearance than one encased in rubber tubing, and the vinyl coating will not tear or crack as does the rubber.

Automotive light sockets are also being dip coated with vinyl plastisol to seal out dust and moisture.[4] The sockets, made by Watts Electric & Mfg. Co., Birmingham, Mich., are coated on fully automatic equipment with a plastisol material formulated by Michigan Chrome & Chemical Co.

Another automotive application of vinyl plastisol dip coating is a brace rod which goes behind the zig-zag springs in seat backs. The main purpose of this coating is to prevent the spring and brace rod from clicking against one another when the car goes over bumps.

F. D. Pace Co. is also coating heavy spring clips used in automotive electrical test equipment. The coating covers the coil spring and all of the clip except the actual con-

[4] "Lamp Sockets Sealed with Vinyl," MODERN PLASTICS *28*, 68 (Feb. 1951).

tact points. The conductor is soldered to the clip after coating and a small vinyl boot is heat sealed over the soldered connection.

As far as non-metallic items are concerned, the most important application of dip coating is in covering industrial protective gloves. The gloves are mounted on a rough form to keep them spread out and insure a uniform coating. Sometimes the fibers are first singed with an open flame to obtain a smoother surface. After dipping, the gloves are allowed to drain, fingers down, then placed in an oven with fingers up.

The coating on gloves cannot be measured in thickness because some of it seeps into the fabric. Thus it is usually measured in pounds per dozen pair. The coating weight is between 2¼ and 4 lb./doz. pair. Such a coating outwears a rubber coating three or four times, has better resistance to oil and grease, and has better color.

Spread Coating

When using vinyl plastisols for spread coating, it is often possible to get as thick a coating in one pass as can be obtained with two or three passes when using vinyl solutions. Thus, vinyl plastisol coated fabrics have a cost advantage over solution-coated fabrics. Plastisol coated fabrics are, in fact, likely to drive nitro-cellulose coated fabrics out of the market because they are in the price range of such fabrics but have the superior qualities of vinyl coated fabrics.

The application of plastisol coated fabrics are the same as those of other vinyl coated fabrics. They range from chemical-resistant protective clothing to decorative applications like upholstery material embossed to resemble straw.

One unusual application of spread coated vinyl plastisols is in the glowing tape[8] used to seal or mark boxes so they can be identified in the dark. The luminescent fabric tape is coated with vinyl plastisol to give it toughness, abrasion resistance, chemical resistance, low temperature flexibility, and moisture protection for the luminescent pigment.

The tape is made by Century Coating Co., Long Island City, N.Y. The 36-in. wide fabric is passed

[8] "Luminescent Tape," MODERN PLASTICS *28*, 188 (June 1951).

good
PLASTICIZER

economical
EXTENDER

AVAILABLE

Lower costs, without sacrificing quality, are possible for many manufacturers of plastics, lacquers and adhesives through the use of Monsanto Ortho-Nitrobiphenyl. Ortho-Nitrobiphenyl (ONB) is a *good*, general-purpose, primary plasticizer that is compatible with a great variety of resins. Freely available.

Write for a copy of Monsanto Technical Bulletin No. O-78, "*Ortho-Nitrobiphenyl, Plasticizer and Chemical Intermediate.*" It is a 10-page, file-size publication that gives valuable technical information on the use of ONB in various formulations. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.

ORTHO-NITROBIPHENYL

MONSANTO
CHEMICALS—PLASTICS

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

SERVING INDUSTRY . . . WHICH SERVES MANKIND

through a spread coating unit six times to give it a series of base coats, a pigmented luminescent coat, and a clear 2-mil top coat. The fabric is then cut into 4-in. wide tape.

A vinyl plastisol spread coating provides the wearing surface for Sandran, an inexpensive hard-surfaced floor covering made by Paulsboro Mfg. Co., Fullerton, Pa., and marketed by Sandura Co., Philadelphia, Pa. The clear vinyl wearing surface permits pattern effects not attainable in other types of floor coverings, because the patterns can be multicolor rotogravure printed.

After the design for Sandran has been printed on a specially developed cellulose sheet, the plastisol wearing surface is applied by reverse roll coater and fused in an oil fired convection oven. The resulting sheet is then laminated to an asphalt saturated felt backing material.

Vinyl was decided upon for the wearing surface because of its inertness to soaps and detergents, water resistance, flexibility, scuff resistance, and abrasion resistance. Plastisol type vinyl resins were used because the multiple passes required with coatings containing a high volatile content would result in prohibitive costs. Thus the combination of desirable properties and the low price of the finished Sandran flooring material was made possible by vinyl plastisols.

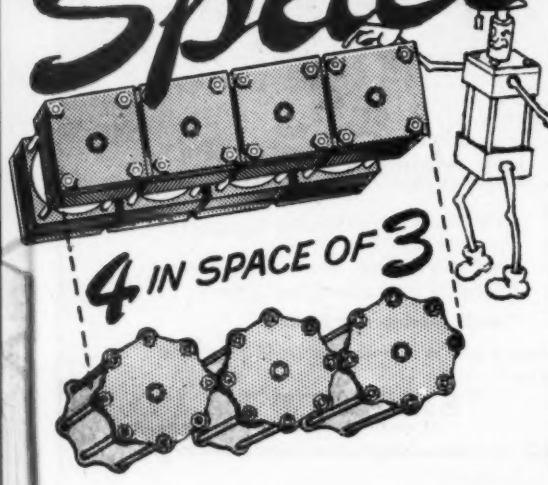
Other Processing Methods

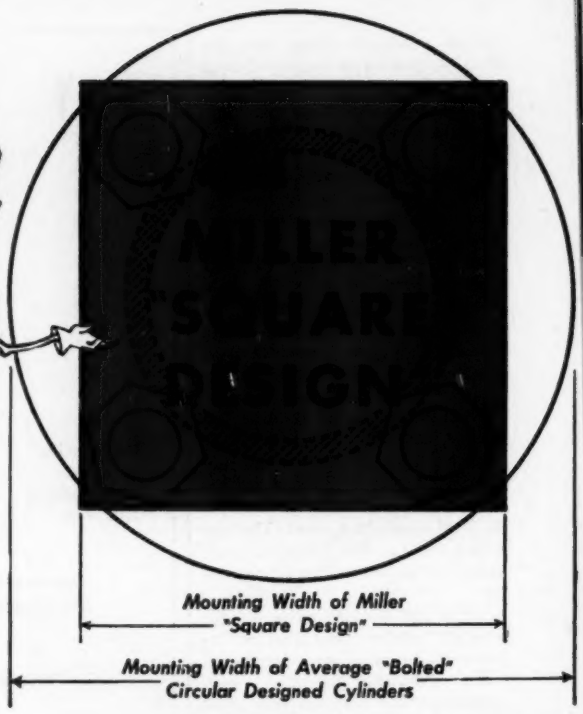
Vinyl plastisols can be processed by methods other than those already discussed. But most of these additional methods are still being developed and perfected.

Cast film. Vinyl plastisols can, for example, be cast into unsupported film or sheeting, although most of the cast film now being made is produced from other materials. A cast plastisol film is usually thin (1 or 2 mil) because the main advantage of plastisols in this field is the fact that a thin film can be produced more easily than by other methods.

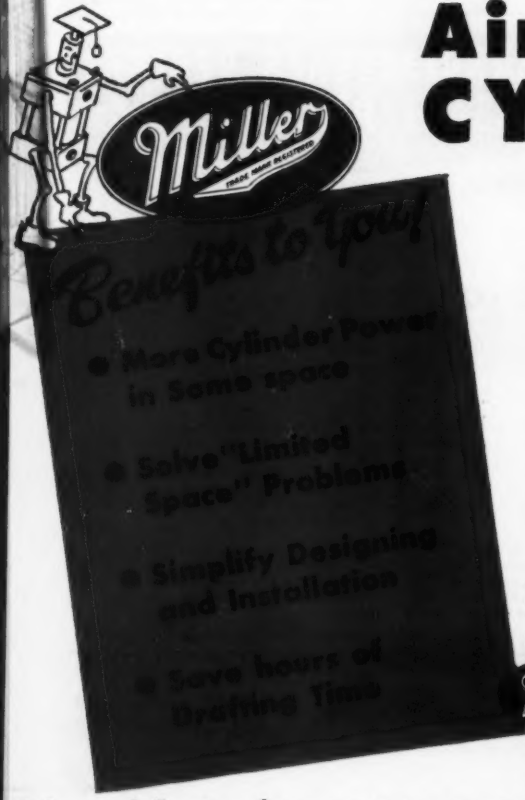
Another advantage of cast plastisol film is the fact that it can be printed easily. The method of printing often used is to print with vinyl inks on a special coated paper, cast the film on the printed paper, and then strip off the film. The vinyl inks, having greater adhesion to the

Save Space





Air *and* Hydraulic CYLINDERS...



The SQUARE DESIGN of Miller Cylinders saves up to 25% of mounting space, permitting more cylinder power in the same space and easier, more convenient installation in "tight spots." Thus, in many cases, machines and equipment can be designed more compact and less costly by using Miller Cylinders. Hours of drafting time can be saved — as only a few straight lines show any view on drawings.

The illustration at upper left shows graphically how *four* Miller Cylinders can be mounted, bore for bore, in the same space required for *three* average "bolted" circular designed cylinders. Some Miller bore sizes permit even greater space-savings.

Other important *standard* features of all Miller Cylinders include: solid steel heads, caps and mountings, hard chrome plated piston rods, dirt wiper seals, and other "quality" features as shown in illustrated bulletins sent FREE on request. Remember, too, that Miller Hydraulic Cylinders (2000-3000 psi) meet the J. I. C. Hydraulic Standards.

Write for illustrated cylinder bulletins A-105 and H-104

COMPLETE MILLER CYLINDER LINE INCLUDES: AIR CYLINDERS, 1½" to 20" BORES, 200 PSI OPERATION; LOW PRESSURE HYDRAULIC CYLINDERS, 1½" TO 6" BORES FOR 500 PSI OPERATION, 8" TO 14" BORES FOR 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1½" TO 12" BORES, 2000-3000 PSI OPERATION. ALL MOUNTING STYLES AVAILABLE.

MILLER MOTOR COMPANY

2020 No. Hawthorne Ave. - Melrose Park, Ill.

AIR AND HYDRAULIC CYLINDERS · ACCUMULATORS · COUNTERBALANCE CYLINDERS · ODDITIES · AIR HOISTS

CLEVELAND — PITTSBURGH — PHILADELPHIA — DETROIT — YOUNGSTOWN — BOSTON
HARTFORD — NEW YORK CITY — DAYTON — ST. PAUL — FORT WAYNE — INDIANAPOLIS
MILWAUKEE — NASHVILLE — SEATTLE — LOS ANGELES — SAN FRANCISCO — BALTIMORE
ST. LOUIS and OTHER AREAS.

Sales and Service from coast to coast

film than to the paper on which they are printed, are stripped off along with the film.

The smooth surface finish attainable is also an advantage of cast film. It is possible to obtain as smooth a surface in a cast film as can be obtained by press polishing calendered film. This characteristic of cast plastisol sheet material has led to its use in advertising signs which adhere to any glossy surface.[6]

Spray coating. There are many possible applications for vinyl plastisol coatings which seem impractical at present because the articles to be coated are too large to be dipped in a tank of plastisol and subsequently put in an oven and baked. The answer to this problem may be spray coating.

Spraying a vinyl plastisol coating presents many problems. If the plastisol material has a viscosity which permits it to be sprayed, it is also likely to run and flow after it is sprayed and before there has been time to apply heat to fuse the material. In certain applications, adhesion to the surface to be coated may present problems. Finding a way to evenly heat a surface too large for an oven also demands ingenuity.

The best indication that the problems involved are about to be solved is the fact that some of the companies working on the development of spray coating methods have solved the adhesion problem, some have solved the flow problem, and some have solved the heat problem. As yet no single company seems to have found all the solutions.

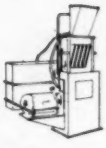
Although spray coating is still in the development stages, it will soon be a practical production method. It will then make possible such applications as linings for large tanks; abrasion-resistant, corrosion-resistant surfaces for parts of ships; sprayed-on, colorful, durable, wall coverings; sprayed-on seats and backs for light metal folding chairs; scratch-resistant, colorful, easily repairable finishes for auto bodies.

Foam. Despite all the methods of using vinyl plastisols mentioned above, there are still some experts who believe that there is another method which will someday account for more vinyl plastisols than all the others combined. The possibilities of foamed vinyl plastisols are so in-

[6] "Signs That Stick," MODERN PLASTICS *29*, 86 (Nov. 1951).

instrumentality in action . . .

for "straight-line" control!



Close control of temperatures where it's most needed is the secret of finer plastic products — the Wheelco Capaciline is the secret of close control — at low cost.

This simple, supplementary control device adds the equivalent of proportioning control to your present instrument. Used on any injection or extrusion machine, Capaciline accuracy eliminates a major cause of spoilage, prevents "over-and-under shooting" and insures product uniformity by narrowing your control band.

Remember, the Capaciline may be specified as an integral part of Wheelco controllers and recorders — or purchased as a separate unit for use with any "on-off" pyrometer controller.

Write today for Bulletin CL-1 — get the "straight line" with no gears or cams. Write to Wheelco Instruments Company, 847 W. Harrison Street, Chicago 7, Ill.

Specify Wheelco — the first name in plastic instrumentation.

wheelco electronic controls

Miccrosol

A superior Vinyl Plastisol developed and manufactured to your specifications by MICHIGAN CHROME & CHEMICAL COMPANY.

MICCROSOL is specially formulated for a wide variety of coating applications as molding, dipping, etc. It is ideal for slush molding of toys and other suitable flexible objects; as well as a coating material for gloves, fabric, wire goods and packaging protection.

Our engineers will be glad to help you with your molding or coating applications. Write for consultation on your problem.

MICHIGAN CHROME & CHEMICAL COMPANY

6342 East Jefferson Avenue
Detroit 7, Michigan

MICCRO Products

we're pioneers in

custom injection molding

with MODERN EQUIPMENT from 4 to 60-oz. capacity

Here at Sinko, we're geared to produce your injection molded parts and products accurately, speedily, and economically. Every item is precision made and tested, and the quality of materials is of the best.

We mold all thermo-plastics, including Nylon; using today's most efficient equipment. Our facilities for producing metal-plastic assemblies are unequalled.

Consult our engineers on all your plastic and metal-plastic molding needs—they'll help you speed production and save money.

WRITE TODAY!

Sinko MANUFACTURING & TOOL CO.
3135 W. GRAND AVENUE • CHICAGO 22, ILLINOIS

triguing that virtually every company in the plastisol business is seriously considering the foam business.

Pieces of foamed vinyl seem to pop up in the inevitable desk drawer full of samples in the office of every producer or processor of plastisols. Practically none of the possessors of said samples are willing to say how they were made, why they were made, or whether any more similar pieces are being made.

Examples of actual production uses of foamed vinyl plastisols are rare. An ice bucket molded of foamed vinyl plastisol by Sponge Rubber Products Co., Shelton, Conn., was described in these pages over a year ago.[7] Elastomer Chemical Co. claims to have the only foamed vinyl plastisol material which can be cast without pressure and molded to intricate shape in inexpensive open molds. This material is now being used in the toy field and in the prosthetic appliance field —but details are confidential.

The Finishes Div., Interchemical Corp., New York, N.Y., has only recently announced the development of a vinyl plastisol from which foam or sponge vinyl can be produced without pressure. But this material is so new that there are as yet no applications in production.

Acknowledgements

We wish to thank the following companies active in the plastisol field for their help in the preparation of this article:

Vinyl resin producers: Bakelite Co., New York, N.Y.; B.F. Goodrich Chemical Co., Cleveland, Ohio.

Vinyl plastisol compounders: American Anode, Inc., Akron, Ohio; Elastomer Chemical Co., Nutley, N.J.; Michigan Chrome & Chemical Co., Detroit, Mich.; The Stanley Chemical Co., East Berlin, Conn.; United Chromium, Inc., New York, N.Y.; The Watson-Standard Co., Pittsburgh, Pa.

Molders, coaters, and other processors: Artistic Wire Products Co., Inc., East Hampton, Conn.; Ideal Plastics Corp., Hollis, N.Y.; Molded Latex Products, Inc., Paterson, N.J.; F.D. Pace Co., Grand Rapids, Mich.; Paulsboro Mfg. Co., Fullerton, Pa.; Plastic Specialties, Inc., Palatine, Ill.; Vinl-Cast, Inc., Akron, Ohio.—END

[7] "Foam and the Future," MODERN PLASTICS *28*, 83 (Oct. 1950).

Ethyl Cellulose

(*Continued from pp.* 99-103)

include the TI-122D flashlights, molded by Gits Molding Corp., Chicago, Ill.; Bright Star Battery Co., Clifton, N.J.; and Lincoln Plastics Corp., Cambridge, Ohio, and many others. They include the Signal Corps handset, molded by Cowan-Boyden Corp., Providence, R.I., for Connecticut Telephone & Electric Corp., Meriden, Conn., and shown in Fig. 10. They include rocket inhibitors (Fig. 11), used to inhibit or control the rate of burning of the rocket propellant, thus permitting accurate flight in a predetermined trajectory. The important quality of ethyl cellulose in this application is its low rate (8%) of nitroglycerin absorption.

Another military use of ethyl cellulose molded in extremely thin wall sections is the radiosonde housing described in January 1951 issue of MODERN PLASTICS, page 62.

Ethyl cellulose is still in use in the proximity fuse, but it is possible that this application will be lost to other materials. There are a number of new developments for the military requiring quantities of ethyl cellulose. Many of these projects are classified, and cannot be discussed.

Miscellaneous Uses

There is quite a variety of miscellaneous applications in which the toughness of ethyl cellulose plays an important part. Well established now are the extruded vacuum cleaner wands, developed by Yardley Plastics Co., Columbus, Ohio, for Scott & Fetzer, Cleveland, for use on the Kirby vacuum cleaner. Figure 12 shows a dust brush for the Regina vacuum cleaner, made by the Regina Corp., Rahway, N.J. The brush is injection molded from Hercocel E by Bloomfield Molding Co., Bloomfield, N.J. In vacuum cleaner parts, this material offers great advantages over aluminum, which used to be standard. It can take a terrific beating, yet parts made from it have a surface softness which will not damage the finish on home furnishings. Its new colorability is a plus, and the parts can be easily cleaned.

Figure 13 shows cable clamps manufactured from Ethocel by Commercial Plastics Co., Chicago, Ill. Here, the toughness of the material and its resistance to attack from the elements are the reasons for using it.

Ethyl cellulose is used in safety goggles by Willson Products, Inc., Reading, Pa., as a matter of straight economics. Cost was lowered, since expensive metal components were eliminated and machine assembly was made easier. In addition, performance was improved.

The economics of freedom from refinishing of molded ethyl cellulose in comparison to metals is illustrated in the housing shown in Fig. 14. Molded for Radio Corporation of America, Camden, N.J., with Hercocel E, this housing is used to cover the electrical equipment mounted in the tops of metal standards in the viewing areas of outdoor theaters.

The molded piece replaces a housing made of metal, the main shortcoming of which was that it had to be refinished at least every two years, involving disassembly of the unit and shipment of the housing back to the factory to be regalvanized. In two years of pilot experience, no failures have been found in the plastic housing; RCA estimates that on the basis of a three-year life for the plastic housings, it would be possible to completely replace them every three years at a lower cost than would be involved in refinishing the metal units.

While ethyl cellulose has excellent electrical properties, those properties are lost in some measure under exposure to moisture. Therefore, ethyl cellulose has limitations as a wire coating. But its abrasion resistance and toughness has made it a logical coating for blasting wire, in which it replaces wax-treated cotton insulation. The Hercules blasting cap assembly shown in Fig. 15 has two ethyl cellulose-coated wires of different colors. The coating is extruded over the bare wire and has excellent resistance to crimping and other punishment. The simplicity of manufacture has reduced costs in this instance.

For many years, the textile industry has been demanding injection molded bobbins and spools. The quill bobbins shown in Fig. 16 are molded of ethyl cellulose by American Insulator Corp., New Freedom, Pa., in a variety of colors for ready

identification in the mill. These bobbins are superior to those made of conventional hardwood in their resistance to moisture and splintering. They have excellent dimensional stability and run true even after months of continuous use. Somewhat higher in initial cost, they have a life expectancy that makes them a sound long-term buy for textile mills.

A braiding bobbin, molded of ethyl cellulose by Dillon-Beck Mfg. Co., Hillside, N.J., has been produced in substantial volume for a number of years, and is considered standard equipment by some producers of fishing line, for example. Another recent miscellaneous application of ethyl cellulose is in the cartridges for the stud driver produced by Remington Arms Co., Inc., Bridgeport, Conn., and reported in the September 1951 issue of MODERN PLASTICS, page 84.

Future Applications

Progress toward big volume of any plastic material frequently hinges on finding one or two applications of colossal poundage. Ethyl cellulose is just waiting for such a proposition. A major possibility is the molded shotgun shell. Figure 17 shows a Danish version of this development, which has been proved completely practical and economical. New types of textile bobbins and spools are, of course, another possibility. Large area moldings produced in volume are bound to come. An office chair with molded seat and back is one of a series of designs created by Sundberg-Ferar, Detroit, Mich., for Hercules Powder Co. to promote new thinking on ethyl cellulose applications.

Taking a lesson from the phonograph record industry, which uses approximately 15% of the ethyl cellulose flake produced by one manufacturer, there appears to be a large potential market in the use of ethyl cellulose with fillers of different kinds to make picture frames, boxes, etc.

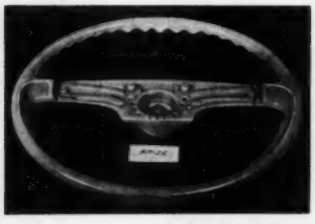
For the present the main emphasis on ethyl cellulose, of course, will be for military use, where it proved itself in the past and where it is being given new opportunities. But whether in military or civilian applications, the improved versions of this powerful plastic are bound to build bigger business.—END

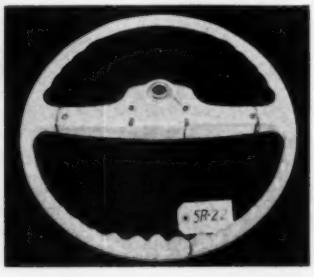
Low Temp.

(*Continued from pp. 127-40*)

lization, has occurred. Much work remains to be done in this field.

Certain of the high polymers show a tendency toward crazing or the development of minute fissures projecting inward from the surface. Generally speaking, this is a phenomenon associated with higher temperatures than are considered here. Crazing can take place, however, at low temperatures where strains are set up in the material as shrinkage occurs. Little is known regarding the effect crazing would have on electrical properties. The magnitude of the effect would depend on the severity of the crazing. It is expected that resistivity might be adversely affected, as would the dielectric properties due to the change in geometry brought out by crazing. Optical properties are adversely affected by crazing in that the percent transmitted light is reduced and scattering increased. It is evident that crazing is a type of mechanical failure and that any part in which crazing has occurred will fail under a lower externally applied load than one in which no crazing was in evidence. This is especially true when a material is tested under fatigue loading conditions.





Figs. 39 (above) and 40 (below)—Molded cellulose acetate steering wheels after subjection to cycle test (175° to —40°F.)

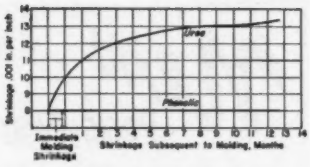


Fig. 41—Mold shrinkage of phenolic and urea plastics

Failure by cracking is a phenomenon usually associated with large moldings subjected to cycles of temperature extremes. This is well illustrated by the failure of a cellulose acetate steering wheel cycled between 175° and -40° F., shown in Figs. 39 and 40.

A molded or fabricated part may fail to give satisfactory service due to warping or buckling at low temperatures. Typical of this type of failure would be the shrinkage with consequent warpage that takes place in large sections of aircraft glazing plastics.

Design Considerations

Failure of a plastic part at low temperatures is usually due to several mechanisms working together. Thus, the cellulosics and some of the thermosetting materials might give poor service due to contraction (thermal) and loss of moisture. The combined effects would cause cracking around metal inserts and distortion which would eventually lead to complete mechanical failure. Another system of combined effects is that associated with molding, that is, mold shrinkage plus after shrinkage plus contraction (Fig. 41 (9), and Table VI). Proper design of the molded article will greatly minimize these effects.

The practical importance of an adequate knowledge of the low-temperature properties of plastic materials has been touched on briefly as the individual property variations with temperature were discussed. As has been previously pointed out, the suitability of a plastic material for a given low-temperature application is governed by a number of factors working together. The most important of these are: 1) linear or volume coefficient of expansion, 2) toughness, 3) dimensional stability related to

Plasticizer . . . Lubricant . . . Waterproofing Agent

WITCO BUTYL STEARATE

This fatty acid ester is made by Witco in two grades, Cosmetic (C-1) and Technical (T-1), with the following typical properties:

	Cosmetic	Technical
Color, APHA	50	300
Acidity (as stearic acid)	0.05%	0.1%
Melting point	19° C	20° C
Odor	Practically odorless	
Specific gravity, 25° C	0.850-0.860	
Pounds per gallon	7.1	
Refractive index, 25° C	1.442	
Flash point (COC)	370° F	
Distillation range, 25 mm	210-220° C	
Solubility in water	0.2%	

Uses: Plasticizer for ethyl cellulose, rubber hydrochloride and other resins; lubricant for metal processing (aluminum rolling); waterproofing agent for integral and surface treatment of concrete, stucco, etc.; in cosmetic and pharmaceutical products; in textile treating as a processing aid in weaving, knitting and twisting to improve the weaving qualities and hand.

Why not see for yourself what Witco Butyl Stearate can do? We'll be glad to send a sample or more information upon request. Ask for Bulletin G-1.

Witco also manufactures other esters such as dibutylphthalate and is equipped to prepare special esters for particular needs. Why not consult Witco regarding your requirements?

WITCO

WITCO CHEMICAL COMPANY • 295 MADISON AVE., NEW YORK 17, N. Y.

Los Angeles • Boston • Chicago • Houston • Cleveland • San Francisco • Akron • London and Manchester, England

loss of moisture or other volatiles, and 4) rigidity or stiffness. The successful application of rubber as a material for automobile tires is due partly to retention of toughness and flexibility at low temperatures. Plastic film is coming into use as a packaging material for frozen foods,

Table VI.—Average Shrinkage of Compounds (Cold Mold to Cold Piece)

Material	*in. per inch*
Phenolic—wood flour filler	0.006 to 0.010
Phenolic—fabric filler	0.003 to 0.007
Phenolic—asbestos filler	0.002 to 0.006
Urea	0.006 to 0.010
Cellulose acetate	0.002 to 0.010
Polystyrene	0.001 to 0.003
Polymethyl methacrylate	0.002 to 0.006

first, because of superior moisture-vapor transmission characteristics, and second, though of equal importance, satisfactory toughness and flexibility at low temperatures. Thermosetting materials are widely used in low temperature electrical applications because their low contraction coefficients allow the use of inserts without cracking.

The successful design of a plastic object for low temperature use depends upon the sound application of the known design fundamentals. It is a difficult matter to weigh each one of these separately due to the interrelationship of the various factors. Before proceeding with the design, the environmental conditions to which the part will be subjected must be as completely specified as possible. A temperature differential as small as 10 degrees C. may influence the choice of one material over another. The selection of material will depend, of course, upon the application, and should be based on the most up-to-date physical properties data available. Combinations of metals with plastics call for a high degree of skill on the part of the design engineer, particularly where the part is to be subjected to severe cycling conditions. Sections should be designed with adequate radii to minimize the concentration of stress due to contraction as the temperature is lowered. The molding method will be governed to a large extent by the material used and the size of the molded object. It is essential that thermosetting materials be molded under such conditions that complete cure is effected. Thermoplastics should be molded so that a

minimum amount of undesirable strain is put into the object. This generally means that the molding should be carried out at as high a temperature as is practicable. The foregoing recommendations are merely guideposts to the design engineer. In the last analysis, a successful design is the one that gives rise to a satisfactory product. Plastics, due to their unique properties, will continue to expand their range of usefulness as engineering materials.

The reader undoubtedly has noted with disappointment the paucity of factual information on many phases of the subject herein discussed. As mentioned earlier it is only recently that data of this type have been considered important, and while our knowledge is being expanded rapidly by many investigators, it will be some time before the data at hand can be considered really adequate. While more information is needed all along the line, more intensive investigation is needed particularly on creep, fatigue, damping, and electrical properties, and on effects caused by cycles of composite forces (such as repeated freezing and thawing, accompanied by combined stresses set up around inserts).

References

1. W. F. Bartoe and D. S. Frederick, "Characteristics of Plastics as Engineering Materials," S.A.E. Journal *52*, 54 (1944).

2. R. F. Boyer and R. S. Spencer, "Thermal Expansion and Second-Order Transition Effects in High Polymers. Part II. Theory," J. Applied Physics *16*, 594 (1945).

3. H. L. Brouse, "A Review of Plastic Materials," Proc. Inst. Radio Engrs. *33*, 825 (1945).

4. L. E. Caldwell, "Properties of Laminated Phenolics," Modern Plastics *20*, 82 (Aug. 1943).

5. F. S. Conant and J. W. Liska, "Some Low Temperature Properties of Elastomers," J. Applied Physics *15*, 767 (1944).

6. T. S. Carswell and H. K. Nason, "Effect of Environmental Conditions on the Mechanical Properties of Organic Plastics," Symposium on Plastics, pp. 22-46, Am. Soc. Testing Mats. (1944). (Symposium issued as separate publication, STP. No. 59.); Modern Plastics *21*, 121 (June 1944); 125 (July 1944).

7. P. M. Field, "Basic Physical Properties of Laminates," Modern Plastics *20*, 91 (Aug. 1943).

8. R. F. Field, "The Behavior of Dielectrics over Wide Ranges of Frequency, Temperature, and Humidity," General Radio Co.

9. General Electric, "Design Data on Plastics for Product Designers," General Electric Co., Plastics Division.

10. H. W. Gillette and F. T. McGuire, "Report on Behavior of Ferritic Steels and Low Temperatures, Part I and Part II," War Metallurgy Committee of National Academy of Sciences, National Research Council, published by the Am. Soc. Testing Mats., Dec. 1945.

11. H. E. Greene and D. L. Loughborough, "Some Physical Properties of Elastomers at Low Temperature," J. Applied Physics *16*, No. 1, 3 (1945).

12. E. O. Hausman, Continental Diamond Fibre Co., Private Communication.

13. T. S. Lawton, Jr., T. S. Carswell, and H. K.

"Please recommend a material which will . . ."

"Our need is a plastic wheel that . . ."

"Do you know of a manufacturer who . . . ?"

". . . and how can we insulate it?"

"Who makes stock molded cookie cutters?"

"Where can I purchase a machine that . . . ?"

Each month, the Readers' Service Department of MODERN PLASTICS answers scores of questions for our readers. Questions range from simple requests for information about the manufacturer of a stock molded item to requests which demand detailed, technical answers.

With their extensive files, reference library and wide knowledge of plastics materials, machinery and procedures, the members of the Readers' Service Department can usually supply the information you request. In addition, the technical and editorial staffs of MODERN PLASTICS are at their disposal for attending to questions which are particular "sticklers." If you have any questions, feel free to forward them. There is no charge or obligation for this service. Address — Readers' Service Department, MODERN PLASTICS. A complete reply to your inquiry will be sent promptly.

MODERN PLASTICS

A Breskin Publication

575 Madison Avenue New York 22, N. Y.

Nason, "Effect of Some Environmental Conditions on the Mechanical Properties of Cellulose Acetate and Cellulose Nitrate Plastic Sheets," Trans. A.S.M.E. *67*, 23 (1945); MODERN PLASTICS *22*, 145 (Oct. 1944).

14. D. V. Mead and R. M. Fuoss, "Electrical Properties of Solids. XIII. Polymethyl Acrylate, Polymethyl Methacrylate, Polymethyl α-Chloroacrylate and Polychloroethyl Methacrylate," J. Am. Chem. Soc. *64*, 2389 (1942).

15. S. O. Morgan and W. A. Yagen, "Dielectric Properties of Organic Compounds," Ind. Eng. Chem. *32*, 1519 (1940).

16. R. E. Morris, R. R. James, and T. A. Werkenthin, "Brittle Points of Natural and Synthetic Rubber Stocks," Ind. Eng. Chem. *35*, 864 (1943).

17. P. Norelli and W. H. Gard, "Effect of Temperature on Strength of Laminates," Ind. Eng. Chem. *37*, 580 (1945).

18. "Polyethylene Resins," published by Carbide and Carbon Chemicals Corp., Plastics Division (1944).

19. J. S. Rinehart, "Temperature Dependence of Young's Modulus and Internal Friction of Lucite and Karolith," J. Applied Physics *12*, 811 (1941).

20. F. L. Roth and L. A. Wood, "Some Relations Between Stress Strain and Temperature in a Pure-Gum Vulcanization of G.R.S. Synthetic Rubber," J. Applied Physics *15*, 749 (1944).

21. N. L. Selker, G. G. Winspear, and A. R. Kemp, "Brittle Point of Rubber Upon Freezing," Ind. Eng. Chem. *34*, 157 (Feb. 1942).

22. D. A. Shinn, "Impact Strength of Plastic Materials at Various Temperatures, MODERN PLASTICS *22*, 145 (July 1945).

23. "Temperature-Resistance Characteristics of Electrical Insulation," Technical Publication 21T4, prepared by the Engineering Staff of James G. Biddle Co., (1946).

24. A. V. Tobolsky, I. B. Prettyman, and J. H. Dillon, "Stress Relaxation of Natural and Synthetic Rubber Stocks," J. Applied Physics *15*, 380 (1944).

25. L. A. Wood and F. L. Roth, "Stress-Temperature Relations in a Pure-Gum Vulcanizate of Natural Rubber Stocks," J. Applied Physics *15*, 749 (1944).

26. T. Alfrey, "Mechanical Behavior of High Polymers," Interscience Publishers, Inc., New York (1948).

27. C. H. Adams and R. Green, unpublished data, Monsanto Chemical Co.

28. A. C. Titus, "The Effect of High Relative Humidities in Producing Changes in Dimensions of Plastics," Technical Paper No. 44-SA25, Am. Soc. Mechanical Engrs., (June 19-22, 1944 Meeting).

29. Unpublished data, Monsanto Chemical Co.

30. R. F. Clash, Jr. and R. M. Berg, "Stiffness and Brittleness Properties of Non-Rigid Vinyl Chloride-Acetate Resin Compounds," Symposium on Plastics, 54-65, Am. Soc. Testing Mats. (1944). (Symposium issued as separate publication STP. No. 59); MODERN PLASTICS *21*, 119 (July 1944).

31. H. Leaderman, "Elastic and Creep Properties of Filamentous Materials and other High Polymers," Textile Foundation, Inc. (1943).

32. C. H. Adams and M. C. Throdahl, "Long Time Load Deformation Effects in Visco-elastic Materials," MODERN PLASTICS *25*, 139 (June 1948).

33. W. N. Findley, "Fatigue Tests of a Laminated Mitscherlich Paper Plastic," Proc. A.S.T.M. *45*, 878 (1945).

34. R. F. Boyer and R. S. Spencer, "Thermal Expansion and Second Order Transition Effects in High Polymers. Part I—Experimental Results," J. Applied Physics *15*, 398 (1944).

35. R. Buchdahl, unpublished data, Monsanto Chemical Co.

36. D. Telfair and H. K. Nason, "Impact Testing of Plastics—I: Energy Considerations," MODERN PLASTICS *20*, 85 (July 1943).

37. H. S. Lockwood, unpublished data, Monsanto Chemical Co.

38. W. E. Welch, R. F. Hayes, T. S. Carswell, and H. K. Nason, "Effect of Temperature and Humidity on Mechanical Properties of Molded Cellulose Acetate Plastics," Proc. A.S.T.M. *46*, 1452 (1946); MODERN PLASTICS *23*, 159 (Aug. 1946).

39. R. F. Clash, Jr. and W. M. Rynkiewicz, "Thermal Expansion Properties of Plastic Materials," Ind. Eng. Chem. *36*, 279 (1944).—END

THE PLASTISCOPE*

NEWS AND INTERPRETATIONS OF THE NEWS

By R. L. Van Boskirk

Plans for the Future

RAW material producers of plastics compounds are making great plans for the future. An idea of what is going on in this vast expansion program can be gained by a partial look behind the scenes at Monsanto, which should be of particular interest to every plastics processor.

New plant in Ohio

The management expects that the company's polystyrene production capacity will be increased appreciably by April or May of 1952 when the new Port Plastics polymer plant in Addyston, Ohio, near Cincinnati, and expanded facilities in the Texas City plant for monomer are completed. Polystyrene latices for wax and paint will also be produced in the Ohio plant.

The company expects no great difficulty with structural steel for the Port Plastics plant since a large supply of the necessary steel is already on the site in the form of a partially built structure which was there when the Addyston location was acquired. In these days of steel shortages for building and equipment, no opening date for a new plant can be guaranteed, but Monsanto is reasonably sure that the Port Plastics plant will move along according to schedule. The California polystyrene plant has already doubled production since its installation in 1950, but is not operating at capacity because of a monomer shortage.

The monomer plant in Texas City was built with private funds in contrast to all but one of the original styrene plants built by the Government to supply the wartime rubber program. Following the explosion of the S.S. *Grandcamp* in 1947 which destroyed the original Texas City styrene plant, Monsanto erected its own private plant to produce styrene for the anticipated expanded needs of polystyrene customers. This source of supply was interrupted at the Government's behest so that styrene could be diverted to the emergency rubber program.

Like all other polystyrene producers, it is safe to assume that, as soon as styrene monomer becomes more freely available, Monsanto also will be ready with new styrene plastic materials having a variety of properties that will enable them to be adapted to even wider markets than are today prevalent in polystyrene.

Phenolic expansion

Monsanto also expects to be able to increase its production of phenol-formaldehyde resins and urea-formaldehyde resins for adhesives and coatings in the near future. The company's phenolic resin molding material plant at Springfield, Mass., is not operating at capacity due to a shortage of phenol—a situation which may be alleviated in the near future. The company is already a big producer of phenolic adhesives through its Western Division plants in Seattle, Wash., and Santa Clara, Calif., and expects to maintain its position in that field.

Monsanto does not talk much about its vinyl program. Its comparatively new polymer plant in Springfield is running below capacity because of a monomer scarcity. It's a cinch bet that that condition won't exist for long—company spokesmen have often repeated that Monsanto aims to produce primarily only those products in which it can be basic. Consequently, it might be taken for granted that the company expansion program in Texas includes plans for a vinyl monomer plant. But how soon this can be achieved is still a matter of doubt due to uncertainty in obtaining steel and other critical materials for structure and equipment. Commitments for chlorine and other raw materials have been obtained.

Improved technological advances in production and quality during the past year or so have made available an ever-increasing quantity of polyvinyl butyral, nearly all of which has been consumed in safety glass for the expanding automobile market. A comparatively new green tinted type is being increasingly used because it helps to lessen the effect of sun glare.

Acetate sheet production has not been at full capacity because of a plasticizer shortage. No expansion is contemplated.

Foreign program

The company's foreign program for plastics is significant for various reasons. It helps to show how American companies have helped sell plastics on a world-wide basis, and it will relieve the pressure on the demand for American-made raw materials. A Monsanto plant has been producing polystyrene in England since July, 1950, from monomer imported chiefly from Germany. A new styrene monomer plant built by Forth Chemical Co., and operated in cooperation with Monsanto, will begin production in 1952.

The company's Canadian plant has been producing polystyrene since 1947—a Mexican plant has been in operation since February, 1951—an Australian plant will begin operations some time in 1952.

A vinyl chloride monomer and polymer plant is under construction in Sao Paulo, Brazil, and will begin operations in 1952 or 1953. Monsanto-Atanor Industrias Quimicas in Buenos Aires, Argentina, has been producing phenolic molding material since last spring.

In Japan, Monsanto has affiliated with Nipponkasei Chemical Industries, producer of vinyl resins, to form the new firm of Monsanto-Kasei Kogyo K.K. of Tokyo.

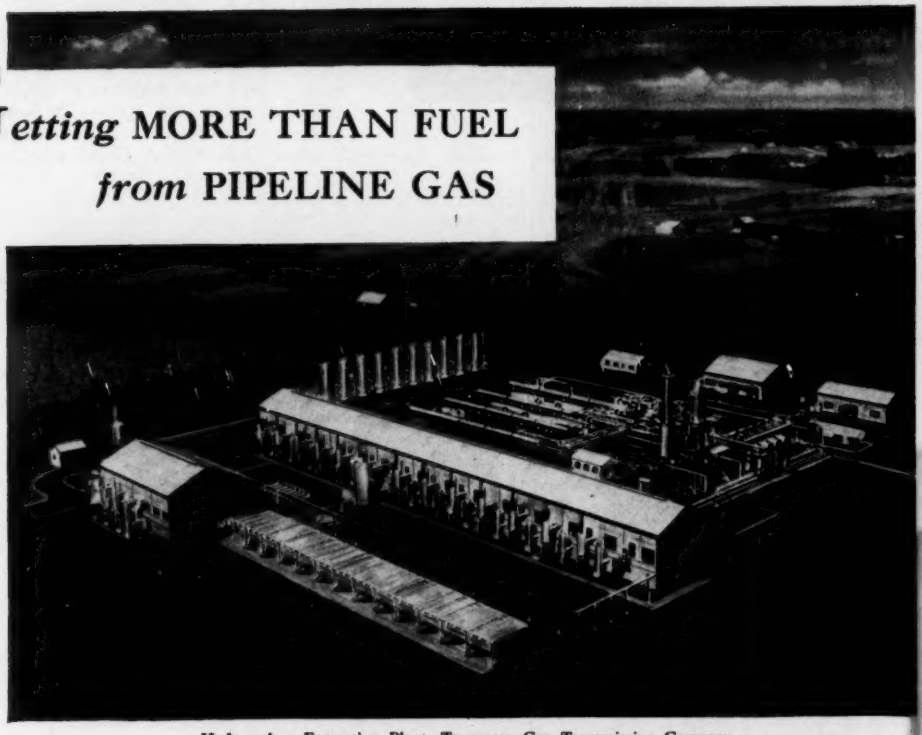
Coating for Acetate

DEVELOPMENT of a new coating material for acetate plastics has been announced by Bee Chemical Co., Chicago 33, Ill. Called Logoquant Series A, the coating is said to have unusual properties of hardness, flexibility, and adhesion, in addition to extreme resistance to embrittlement. It is rapid drying, and can be sprayed on in any weather condition including 100% humidity.

Acetate applications coated with Logoquant Series A will withstand

* Reg. U.S. Pat. Office.

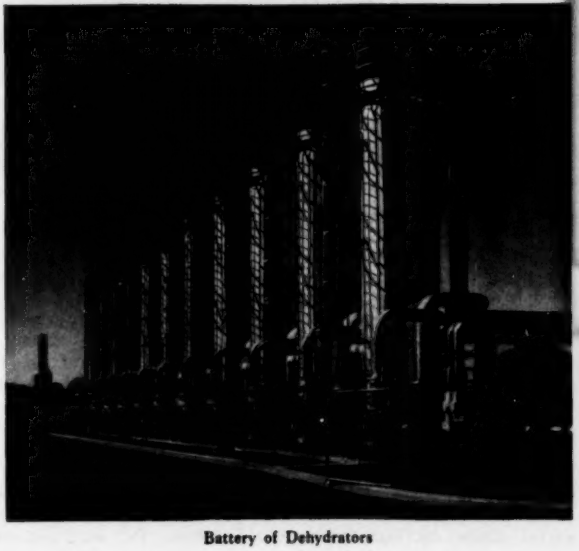
Getting MORE THAN FUEL *from* PIPELINE GAS



Hydrocarbon Extraction Plant, Tennessee Gas Transmission Company

This plant of the Tennessee Gas Transmission Company at Gabe, Kentucky, is the first of its kind to be constructed adjacent to a major natural gas transmission line, for the further extraction of bottled gas and aviation and motor gasoline components from "dry" pipe line gas.

Stone & Webster Engineering Corporation made a report and appraisal of the economics, feasibility and best location for the project and was employed for the design and construction of the plant.



Battery of Dehydrators

STONE & WEBSTER ENGINEERING CORPORATION

A SUBSIDIARY OF STONE & WEBSTER, INC.

PLASTISCOPE

the "scotch tape" test, will not break when the item is bent, and will withstand more abrasion than the acetate plastic itself.

The coating was designed to meet the problem of "blushing," a dulling of the surface gloss or loss of adhesion caused by high humidity.

Recommended particularly for coating toys and for other Christmas applications, the coating is available in a full line of bright metallic and pigmented colors.

Cements for Acrylic

THREE new cements—CD 2, 94, and 114—have been developed by Chemical Development Corp., Danvers, Mass., specifically for bonding acrylic materials. CD 2 was developed for Plexiglas; 94 and 114 for Lucite. These are monomer base cements and, consequently, are expected to produce bonds of exceptional strength and good appearance, two factors which make them preferable to the use of solvents alone. They are particularly recommended to manufacturers who wish to form, sand, or machine the final product after assembly, or who want a strong completely welded joint.

N.J. Plastics Plant

CONTRACT for a new plastics plant at Linden, N. J., has been awarded to Wigton-Abbott Corp. by Marco Chemicals, Inc., Sewaren, N.J. The one-story building, to cost an estimated $150,000 when completed in about five months, will replace the present Sewaren plant. Marco plastics are used in the production of glass fishing rods as well as aircraft, automotive, electronic parts.

Molded Stock Components

STOCK component parts molded of urea formaldehyde and acetate have recently been introduced by Synthetic Plastics Sales Co., 461 Eighth Ave., New York 1, N.Y. Potential uses suggested for these new parts include the manufacture of toys, games, infants' accessories, buttons, decorations, and shade pulls.

Six general designs are featured by the manufacturer: crinkle wheels; two-part balls with center hole; two-part ovals with center hole; washers; molded giant rings with milled surfaces; and scalloped half-shells with center holes. They are available in various sizes and the following colors: pink, baby blue, copper blue, red, maize, white, Nile and Kelly green. Other colors are available on special order.

Polyethylene Jar

DEVELOPMENT of an unbreakable double-wall polythylene jar, five times lighter than glass jars of similar size, has been announced by Injection Molding Co., 3823 Independence Ave., Kansas City, Mo. The patented double-wall construction provides insulation and prevents bleeding of essential oils which often occurs in single-wall polyethylene containers. The jar is available in any color. All printing and labeling is heat etched by a special company process.

Armored Tubing

SQUARE, triangular, oval, and streamlined shapes of Dekoron plastic armored metal tubing have been added to the line of round tubing produced by Samuel Moore & Co., Mantua, Ohio. The company's patented extrusion process for coating the tubing permits application of vinyl or polyethylene plastic over seamless tubing or tubing with welded, lap, or butt seams. It can be applied over any kind of metal core. The armored tubing does not crack, chip, or flake. It resists corrosion from salt air, moisture, oils, acids, and alkalies, and remains unaffected by normal temperature changes.

Made in a wide variety of sizes, colors, and finishes, the tubing is suggested for use in furniture, appliances, garment rails, crowd control rails, and automotive parts.

Glass Textile Weaver Buys Firm

ACQUISITION of the assets of Horace Linton & Bro., Inc., Philadelphia, Pa., manufacturer of industrial tape, by Hess, Goldsmith & Co., Inc., New York, N.Y., weaver of glass textiles, has been announced. Production of tape will continue under a newly formed unit, the Horace Linton Div., at narrow fabric weaving plants in Philadelphia and Pleasantville, N.Y.

Staff members of the new division are: Wallace R. Linton, vice president and general manager; Dominic A. Siravo, assistant to the general manager; Raymond F. Clark, sales manager. No other changes in Horace Linton personnel have been made.

Enters Glass Fiber Production

UNDER licensing agreement with Owens-Corning Fiberglas Corp., Pittsburgh Plate Glass Co. will enter the fiber glass production field in the near future. Two types of fiber glass —strand fiber for electrical insulation and super-fine fiber for insulation, sound absorption and flotation purposes—will be manufactured. A separate development and production unit to be known as the Fiber Glass Div. will be formed with J. Hervey Sherts as general manager.

Plastics Refresher Course

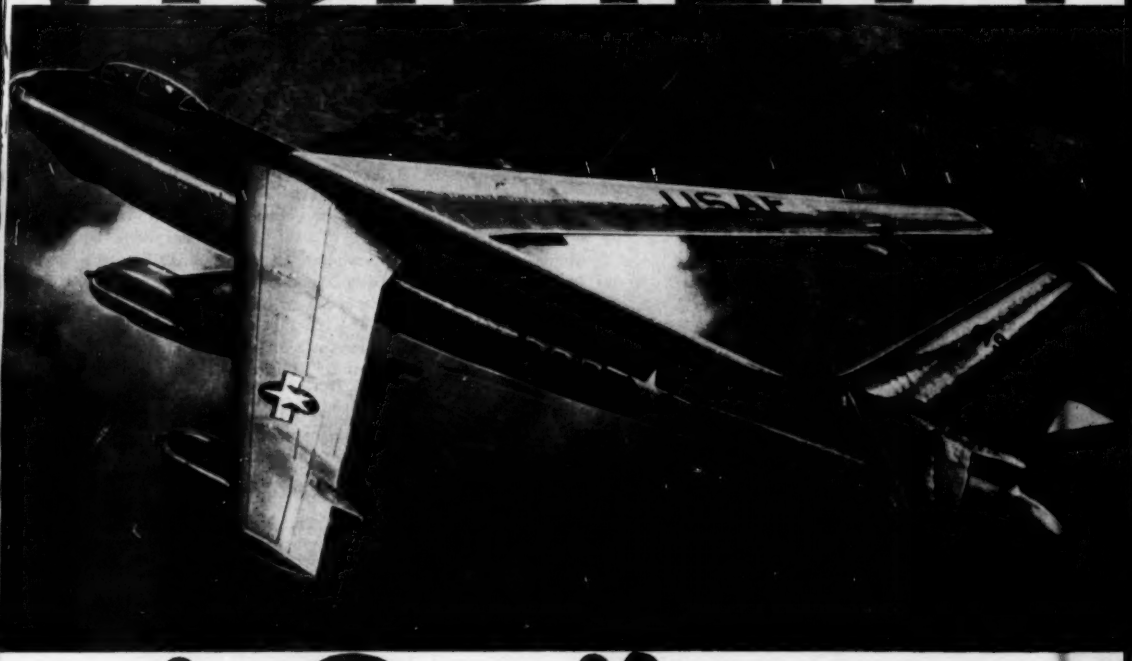
THIRD annual Plastics Technical Service Refresher Course for plastics salesmen from all over the country was recently completed at The Dow Chemical Co.'s plant, Midland, Mich. The course included lectures on the various Dow plastics, industrial movies of interest to the plastics industry, demonstrations of molding machines and techniques, and visits to Dow's plastics manufacturing plants.

Decal Process

MANUFACTURERS are transferring colorful pictures in fine detail to shower curtains, tablecloths, children's inflatable toys, and similar items made of Bakelite vinyl film with a special decal produced by Palm, Fechteler & Co., 220 W. 42nd St., New York, N.Y. The new process employs decals with inks which are based on vinyl resins with the same flexibility, durability, and resistance to moisture, mold, oil, and chemicals as the vinyl film itself. Warwick Chemical Co., 100 Pulaski St., W. Warwick, R.I., makes the inks.

Application of the decals is as follows: A special solution provided with the decals is first applied to the film surface with cheesecloth. The decal is then placed face down in position, and pressed to the film surface with a rubber roller. When

VISIBILITY



by Swedlow

The BOEING B-47 stratojet is the fastest known bomber in the world. This great six-jet engine powered, swept-wing bomber will be produced in quantity for the U.S. Air Force by Boeing Airplane Company, Wichita, Kansas, the Douglas Aircraft Co., Tulsa, Oklahoma and the Lockheed Aircraft Corp., Marietta, Georgia.

Transparent laminated canopies and all-nylon fuel cell backing (in accordance with Boeing specification BMS-8-13) are SWEDLOW's contributions to the admirable functional efficiency of this superb fighting machine.

SWEDLOW was selected as a major supplier of these important factors because of SWEDLOW's unique reputation and more than a decade of experience in the development and fabrication of vital parts for the aircraft industry.

● ***We shall be glad to assign our staff engineers to work with you in solving problems in all phases of plastic fabrication.***

PLASTISCOPE

water is applied to the decal with a sponge, the paper backing slides off. The transferred decal is then cleared of surplus adhesive gum by tapping gently with damp cheesecloth, and finally dried.

Fast Curing Phenolic Compound

CURE time on parts produced in compression, transfer, and plunger type molds is speeded by the use of a new fast-cure phenolic compound developed by General Electric's Chemical Div., Pittsfield, Mass. Designated as GE-12853, the new compound is recommended for those applications now being molded with general purpose phenolic materials. Reported savings in cure time are: meter bases, 20%; radio cabinets, 16%; tube sockets, 25%; iron handles, 34%; and tube bases, 40 percent.

The compound, which is produced in black, gives good finish and high gloss in molded parts. It combines good physical and electrical properties, and its preforming characteristics are excellent. Any common method of finishing may be used.

Aqueous Emulsion for Vinyl

FILLING a long standing need for an aqueous emulson type adhesive for laminating vinyl film to paper is Polybond D-319, manufactured by Polymer Industries, Inc., 1108 30th Ave., Astoria, N.Y. The product handles readily on squeeze roll or other standard equipment.

Modifier for Plastisols

CONTRIBUTING to the control of higher ranges of rigidity and dielectric strength in vinyl plastisols and organosols is Kenflex, a plasticizer recently announced by Kenrich Corp., 120 Wall St., New York 5, N.Y. The manufacturer claims that Kenflex has led to the development of plastisols for wire insulation, potting compounds, printing inks, and coatings.

A popular plasticizer combination giving a high viscosity plastisol is reported to be two parts Kenflex A to one part DOP mixed and applied at elevated temperatures. A plastisol containing this plasticizer tends to maintain constant viscosity during the preheating period until the fluxing point is approached. Compared to all ester plasticizers, it gives higher tensile strengths and more rapid fluxing, along with the elimination of excessive rubbery characteristics. The manufacturer also claims that Kenflex improves bonding, surface finish, and dispersion of fillers and pigments.

Phenolic Foam

UNUSUALLY high compressive strength—up to 500 p.s.i.—is offered by a new phenolic foam core material developed by Rezolin, Inc., 4825 W. Jefferson Blvd., Los Angeles, Calif. Called Corfoam, the product is a liquid phenolic resin which, when mixed cold, will foam at room temperature to a hard consistency without being subjected to applied heat. It can be foamed in large masses without loss of cell control or undue shrinkage; moisture absorption is low; it will not soften under heat; and tests have revealed good insulating characteristics. It has good adhesion to wood, paper, and most plastics, and will not support combustion.

Corfoam has a honeycomb appearance with tiny globular nonconnecting cells, and a density of approximately 14 lb. per cu. foot. Its physical properties suggest its use in applications where high structural strength is required.

Rezolin is constructing a $225,000 office and factory building at 5736 96th St., Los Angeles, which will house complete tool fabrication facilities for making plastic dies, jigs, and fixtures. The building is expected to be completed by Jan. 1.

Talking Books

RECORDS for the blind, known as Talking Books, are now being produced on a 150-ton press made by F. J. Stokes Machine Co., 5500 Tabor Rd., Philadelphia 20, Pa. The Talking Books consist of sets of transcriptions on which are recorded 1600 classic and contemporary books. Each record is 12 in. in diameter, and is made of thin, semi-flexible vinyl. Title and page number of the book are marked in Braille on each record. Played at a turntable speed at 33⅓ rpm., each record has a listening time of 15 min. per side, so that 18 double-faced records are required to transcribe an average-length book, a reading time of about 9 hours.

Talking Books are distributed through the Library of Congress to 25 regional libraries for the blind.

Air Force Insulating Tube

FIRST polyvinyl electrical insulating tubing for aircraft wiring to pass the rigid Air Materiel Command tests conducted at Wright Field in accordance with USAF Spec. 12047-A has been made by Extruders, Inc., 3232 W. El Segundo Blvd., Hawthorne, Calif. The tubing is called Insulite XLT-175.

The Air Force specification, originated in October 1949, calls for vinyl insulating tubing with excellent low temperature characteristics, complete resistance to corrosion and fungus growth, and high dielectric strength.

Vinyl Bonding Agent

NOW being introduced to the plastics industry by Schwartz Chemical Co., Inc., 326 W. 70th St., New York, N.Y., is Vinyl Cement, a new solvent-type bonding agent for cementing most of the commonly used vinyl plastics. Especially formulated for use with flexible vinyls, the new water-white cement is said to be equally efficient when used on rigid vinyl sheets and molded sections. It requires only one surface application, and adhesion results in a few seconds.

Glass-Resin Prepared Sheet

A GLASS fiber reinforced-polyester composition called Fiberlux, which exhibits the best characteristics of each of the basic materials, has been announced by International Glass Fibres Corp., Baltimore, Md. The material is light in weight —8 oz. per sq. ft.—has a high tensile strength of 8000 to 10,000 p.s.i., and is not affected by sub-zero temperatures or temperatures up to 300° F. It has good load bearing characteristics, optimum light transmission, and low heat transmission.

Fiberlux can be cut to size with a great variety of cutting tools and, like sheathing, it can be nailed to wood framing or Stran Steel. When

PLASTISCOPE

nailing, a shock area about 1/16 in. around the nail hole will usually occur, but this will have no effect on the basic strength of the material.

Sheets of Fiberlux can be fastened together or to other materials by using ordinary sheet metal screws. Fiberlux does not conduct electricity and, therefore, there is no danger of electrolysis occurring.

Specs for QM Tray

THE Quartermaster Corps is working on specifications for an 8 by 10 in., three-compartment, disposable plate. At present, such a tray is produced from melamine-impregnated paper and is fairly satisfactory, but the department thinks that possibly an even more satisfactory job can be done. Specifications will not mention the material used, but will specify performance properties. At present the plate is being used to feed soldiers on troop trains, but it could be used for many other purposes and developed into large volume production.

This tray should not be confused with the well known acetate tray liner which fits into compartments in a melamine tray and is thrown away after use. The article for which this specification is being drawn up is a separate item that will be used primarily as an expendable feeding tray to be used once.

Spec for Strapping

AN INTERESTING application for plastics is MIL-C-10922 (QMC) concerning strapping that is used on an individual weapons case for airborne troops. The specs call for an impregnation of the end of the strap which is used to fasten the case.

The specs say that the plastic shall be a thermoplastic resin that will not crack, peel, or flake from the webbing when the strap is conditioned for 4 hr. at −40° F. and then bent back upon itself in each direction across the warp over a 1/8-in. mandrel. The buckle end of the strap shall be impregnated with a solution of the plastic material in such manner as to provide smooth operation of the quick adjustable buckle. The impregnated area of the strap shall extend from the end of the strap to a distance 2¾ in. from the end. The specs definitely state cellulose nitrate shall not be used.

Silicone Insulation

SILICONE rubber treated glass cloth for motor and cable insulation is now in production at General Electric Co.'s Coshocton, Ohio, plant. The glass cloth is passed through a liquid solution of silicone rubber in a continuous dipping process. After application of heat to cure the rubber, the treated fabric is ready for use. Because of its high heat resistance and excellent flexibility and electrical properties, chief use of the treated fabric is for motor and cable insulation, although other uses in the electrical field are anticipated.

Mold Service for Foundries

SPECIAL sample mold service for foundries interested in the revolutionary resin-sand shell molding process has been announced by Monsanto Chemical Co.'s Plastics Div. The new service provides foundries with an opportunity to obtain a sample mold made from shells of Resinox phenolic resins and sand on patterns sent in to Monsanto.

According to James R. Turnbull, general sales manager of the Plastics Div., the service "will permit foundry operators to see at first hand the significant savings in clean-up, machining time, and labor made possible by the shell molding process. (This process is applicable to the casting of any metal which can be cast in sand by currently used methods.) Detailed instructions have been prepared, including match plate dimension data, packing and shipping data, and blueprints of investment box equipment."

Plastic Hammers

USE of plastic hammers with replaceable tips to replace rawhide hammers resulted in a cost reduction of $2109 for Westinghouse, according to New Plastic Corp., 1041 N. Orange Dr., Los Angeles 38, Calif., developer of the hammers.

New plastic asserts that its Nuplaflex and Nuplan (nylon) tips used in Nupla hammers made from plastics are safety tools—they are spark proof, will not chip or mushroom, and will return slowly but completely to their original shape even under extreme pressure. Furthermore, they have no rebound such as is common in rubber tips.

The hammer tips are interchangeable and have a patented tip locking device that eliminates any danger of tips working loose.

In comparative tests at a Chrysler plant, a Nupla hammer lasted 500 working hours, while its nearest rival, brass, lasted only 8 hours.

Elastic Upholstery

BURNISHED antique is a new finish and texture in the Elastic Naugahyde vinyl-coated upholstery material produced by U.S. Rubber Co. It is being made in 10 colors, all of which are produced in 52-in. minimum width which stretches to 58 inches. The upholstery material, which is being used on home, hotel, restaurant, and office furniture, combines an elastic plastic and a special elastic fabric which facilitates tailoring around severe curves and contours. It is made with a non-migrating plasticizer that keeps it from drying out or cracking.

Consulting Chemists' Election

AT THE annual meeting of the Association of Consulting Chemists and Chemical Engineers, Inc., the following officers were elected for the coming year: Erwin Di Cyan, president; Earl D. Stewart, vice president; William C. Bowden, Jr., secretary; and Foster Dee Snell, treasurer. Elected as councillors for three years were Robert S. Aries, Elliot A. Haller, Hugo Klein, Clarence E. Mange, Robert V. Siefel.

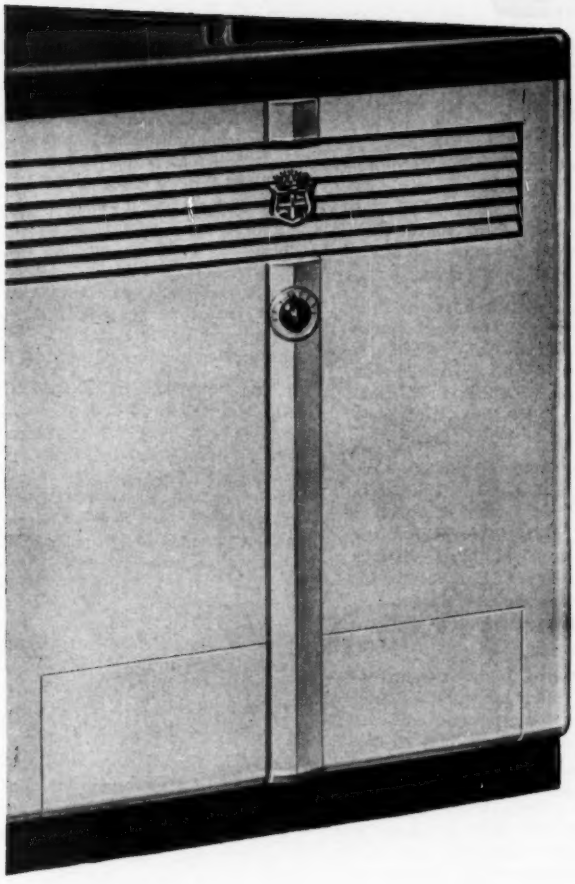
New Yarn Plant

NEWEST yarn plant of Owens-Corning Fiberglas Corp. has just been completed at Anderson, S.C., and is already in capacity production. Expansion of manufacturing facilities was necessitated by the demand for Fiberglas yarns.

COMPANY NOTES

Crystal Tube Corp. has moved to new offices at 6625 W. Diversey Ave., Chicago 35, Ill.

Steiner Plastics Mfg. Co., Pratt Oval, Glen Cove, L.I., is operating



Are you ready for the big jobs ahead?

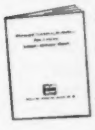
With big, new presses . . . developed to handle parts not even dreamed of a few years ago; with potential business to be had from almost every industry—the plastics molder is truly becoming BIG BUSINESS.

This, plus the fact that plastics are today recognized as *essential* materials in industry and in our defense program, makes it more important than ever to squeeze every bit of production possible from every ounce of material.

Good management demands maximum top quality production while holding operating costs to a minimum. Good management gets it by scrupulous attention to mold design, material selection, molding techniques, etc.

These—and many other positive steps in efficient plant operation are discussed in a new booklet published by Monsanto, "Operating Suggestions for Molding Lustrex Styrene."

Lustrex: Reg. U. S. Pat. Off.



For practical information on how to increase efficiency in your plant, send for your free copy of this booklet today. The coupon is for your convenience.

MONSANTO
CHEMICALS AND PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY,
Plastics Division, Room 2612, Springfield 2, Mass.

Please send me your booklet, "Operating Suggestions for Molding Lustrex Styrene."

Name & Title _____

Company _____

Address _____

City, Zone, State _____

PLASTISCOPE

at full speed despite a fire which occurred late in September. The fire was confined to the shipping room and finished stock departments, and did not touch the fabrication lines or raw material stock rooms. All production commitments will be met.

General Electric Co. announces two appointments in the Chemical Div.: **Charles H. Kline** has been named manager of sales for phenolic products of the Chemical Materials Dept., and **J. Rae Stirrat** has been appointed manager of product line planning for the Marketing Dept.

George Woloch Co. has moved to larger quarters at 82 Beaver St., Room 605, New York 5, N. Y.

Extruders, Inc., manufacturer of plastic films, tubing, and garden hose, has moved to a new and larger factory at 3232 West El Segundo Blvd., Hawthorne, Calif.

Commercial Plastics & Supply Corp., 55 Prince St., New York, N. Y., distributor of acrylic and acetate rods, sheets, and tubes, has opened a branch office at 627 Cross St., Malden, Mass.

aaRBee Plastic Co. announces a change of address of its plant and office to 4505 W. Jefferson Blvd., Los Angeles 16, Calif.

Precision Metalsmiths, Inc., has moved to 1081 E. 200th St., Cleveland, Ohio.

Wheelco Instruments Co. has moved its Western Div. sales office to larger quarters at 2320 Milwaukee Ave., Chicago, Ill. The new office is under the supervision of **R. A. Schoenfeld.**

Durable Formed Products, Inc., 6 Greene St., New York 13, N. Y., has added two pneumatic presses and one thermostatically controlled heating oven to its Forming Dept.

Columbia-Southern Chemical Corp., a subsidiary of **Pittsburgh Plate Glass Co.**, announces that **H. W. Gleichert** has become assistant to the vice president in the new sales organization; that **A. W. Reynolds** was made administrative assistant to the vice president in charge of sales; and that **E. W. Haley** has been transferred to Pittsburgh as director of sales.

Worthington Pump & Machinery Corp. announces the appointment of **J. B. Laramy** as manager of the Marketing Research Dept. and of **H. V. Rasmussen** as executive engineer of the Wellsville, N. Y., plant.

National Research Corp. announces that the company plans to build additional plant facilities in Newton, Mass. Also announced is the appointment of **James L. Vaughan** as director of the Process Engineering Dept.

Chicago Molded Products Corp. has increased its plant facilities by the addition of Section 5, a modern monitor-type plant devoted principally to special finishing operations on essential goods. This section was formerly the plant of **Hafner Mfg. Co.**, producer of wind-up type toy trains.

Plaskon Div., Libbey-Owens-Ford Glass Co., announces the following changes in the glues and industrial resins sales organization: **H. A. Raymond, Jr.**, has been made sales manager for industrial resins and will supervise national sales; **Ralph W. Burdeshaw** has been appointed to the new post of southern sales manager for industrial resins; **Robert W. Weant** succeeds Mr. Burdeshaw as sales representative in South Carolina, Georgia, Florida, and Alabama. **Charles E. Walker** has been named to head a new New England office at 10 High St., Boston. Mass.

The company also announces the promotion of **Donald Delaney** to sales manager for coating resins and **Victor W. Ginsler** to assistant sales manager. **W. W. Wommack** has joined the molding compound sales force of the same division.

Yardley Plastics Co., 142 Parsons Ave., Columbus, Ohio, has appointed **Charles A. Ebner** as executive vice president. **Walter E. Jacobson** succeeds him as general manager.

American Polymer Corp., Peabody, Mass., has reduced prices on styrene-butadiene latices. Polybutadiene latex Polyco 418, at approximately 30¢ a dry lb., is used in extending natural latex for the adhesive, foam rubber, dipped goods, and similar industries. All prices and products are described in data sheet P 24.

Plasti-Line Co., Knoxville, Tenn., is the subject of a recent feature article in the *Knoxville News-Sentinel*. Plasti-Line is doing a $500,000 yearly business and the chief products up to now have been acrylic signs for six major oil companies and the Coca-Cola Bottling Co. Other products are some 40 different fabricated items for 700 hosiery mills. The company has recently tooled up to manufacture aircraft canopies.

Gering Products, Inc., Kenilworth, N. J., has announced that **Automotive Materials Corp.**, Fisher Bldg., Detroit, Mich., is now representing the Gering plastics firm in the automotive field. The latter company is a producer, convertor, and merchandiser of automobile, aircraft, and transportation materials.

PERSONAL

Gage Olcott has been transferred from New York to the Plastics Dept. of **The Dow Chemical Co.** at Midland, Mich., where he is working on Styron merchandising.

Alfred L. Therrien has been appointed field sales representative in upper New York for **Monsanto Chemical Co.'s Plastics Div.**, Springfield, Mass.

Francis H. Snyder, president of **Snyder Chemical Corp.**, Bethel, Conn., has resigned as active head of the firm in order to devote full time to his consulting practice in chemical research.

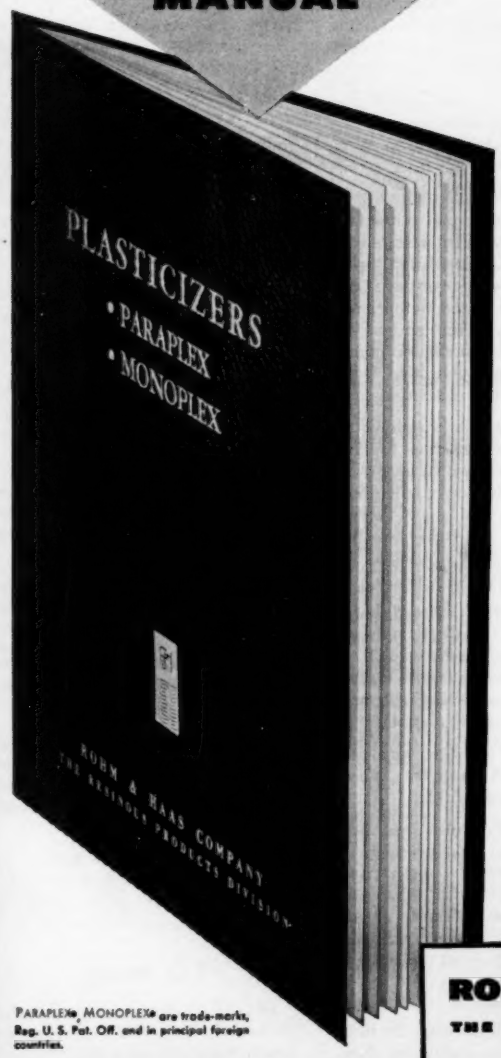
W. Burl Saul, formerly with Power Press & Equipment Co., has been named vice president in charge of production and engineering for **L & J Press Corp.**, Elkhart, Ind.

Robert D. Orde, formerly with Rona Plastic Corp., has been appointed general sales manager of **Sterling Plastics Co.**, Union, N. J. He will supervise sales of precision plastic molded parts as well as consumer products in the stationery and housewares field.

Bernard G. Murray has been

Just Off Press...

THIS FACT-PACKED PLASTICIZER MANUAL



PARAPLEX®, MONOPLEX® are trade-marks, Reg. U. S. Pat. Off. and in principal foreign countries.

Send For Your Copy

Here is invaluable information on seven different plasticizers—polymerics and monomerics—which alone or in combination afford almost all wanted properties.

In its pages, we've compiled concise, authoritative data on the Rohm & Haas PARAPLEX and MONOPLEX plasticizers—physical properties, uses, suggestions for formulation and handling. Contents include essential information on:

PARAPLEX G-25—High molecular weight polymer for top quality upholstery sheeting, coated fabric, high-temperature electrical insulation, and all applications requiring resistance to migration and extraction.

PARAPLEX G-40—High molecular weight polymer for upholstery, industrial and surgical tapes, liner stock. Outstanding in oil resistance and resistance to migration into rubber.

PARAPLEX G-50—Intermediate molecular weight polymer for film sheeting and coated fabric. Good resistance to migration and extraction, improved handling characteristics.

PARAPLEX G-60—Intermediate molecular weight polymer for broad general use. Low viscosity, good efficiency and good low temperature flexibility. Outstanding resistance to soapy water and detergents. Unique stabilization effect against heat and light.

MONOPLEX DOS—Dioctyl sebacate, for outstanding low temperature flexibility, low volatility, and good soapy water and detergent resistance.

MONOPLEX DBS—Dibutyl sebacate, for high plasticizing efficiency and good low temperature flexibility.

MONOPLEX DCP—Dicapryl phthalate, a general purpose monomeric ester.

As a guide to efficient, economical plasticizing, it will pay you to have on file this convenient reference manual. A request on your business letterhead will bring your free copy without obligation.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

THE RESINOUS PRODUCTS DIVISION

Washington Square, Philadelphia 5, Pa.

Representatives in principal foreign countries

PLASTISCOPE

transferred to New York as sales representative of the **Color Div., Ferro Corp. Henry W. Fishkin** succeeds him as Chicago representative.

Osgood V. Tracy, on leave as general manager of the Chemical Products Dept. of Esso Standard Oil Co., has been appointed Deputy Director of **NPA's Chemical Div.**

Jack H. Dollinger has been appointed sales manager for **Glyco Products Co., Inc.,** Brooklyn, N. Y.

Alan Insley has joined the New York office of **Mineral Pigments Corp.,** Muirkirk, Md., manufacturer of synthetic pigments.

Paul E. Wilson, 2636 S. Michigan Ave., Chicago, Ill., has been appointed exclusive representative for Hydro-Line air and hydraulic cylinders in the Chicago and northern Illinois territory for **Hydro-Line Mfg. Co.**

Miss Violet Szantay was appointed vice president and assistant to the president of **Santay Corp.,** Chicago, Ill., plastic molder and automotive accessories manufacturer.

Russel Wright has been elected president of the **Society of Industrial Designers** for the year 1951-52. He succeeds **Dave Chapman.**

James P. Duffy, director of flexible packaging sales for Union Bag & Paper Corp., has been elected president of the newly formed **National Flexible Packaging Association.**

Harris C. Miller has been assigned by **Hooker Electrochemical Co.** to the sales territory of upper New York and western Pennsylvania.

Kenneth J. Plants has been appointed general sales manager of the **Plastic Film Div., Goodyear Rubber Sundries, Inc.,** New Haven, Conn. The firm is expanding its activities in the plastics film field. Mr. Plants' headquarters are at 500 Fifth Ave., New York, N. Y.

E. V. Steele has purchased the interests of **Eric Schaal** and **Chas. Arrowsmith** in **Urrite Plastics Fabricators,** and has taken **Ted H. Fengler** into partnership. The company specializes in difficult fabrication problems using acrylic.

Laurence E. Rossiter has been named New England District Sales Manager for **Nopco Chemical Co.**

James H. Wolcott has been appointed sales manager of the **Machinery Div., Reed-Prentice Corp.** He will supervise sales activities covering machine tools, plastic injection molding machines, and die casting machines. He was formerly branch manager in Los Angeles and Chicago.

David A. Sharpe has been named Eastern territory sales engineer for **The Fiberite Corp.,** Winona, Minn. His headquarters are at Andover St., RFD #1, Lowell, Mass.

Johan A. Muller has joined the **Lewis Welding & Engineering Corp.,** Bedford, Ohio, as head of a newly formed development department. Mr. Muller, a native of the Netherlands, has specialized in the design and development of hydraulic equipment, particularly in its application to the plastics and rubber industries.

James L. Bixby was appointed director of public relations for **The Chemstrand Corp.,** which is now organizing to produce synthetic fibers, including nylon and a new acrylic fiber, "Acrilan." Mr. Bixby was formerly with the public relations department of St. Regis Paper Co.

John H. Banks, formerly with Ford Moulded Fiber Corp., has been named production and research engineer for **International Molded Plastics, Inc.'s** new product, Structoglas, a polyester sheet material.

W. S. Saville has been appointed manager of the **Aircraft Div., Narmco, Inc.,** San Diego, Calif.

William C. P. Zabel has been named executive vice president of **Associated Plastic Companies, Inc.,** Suite 1195, Merchandise Mart, Chicago, Ill. He was president of Admiration Plastic Co. which will soon become a subsidiary of Associated.

Deceased

Dr. James Paul Chittum, 39, technical sales representative for Kralastic and Vibrin resins, **Naugatuck Chemical Div., U. S. Rubber Co.,** died recently after a long illness. Dr. Chittum joined the company in 1937 as a research chemist and did much of the fundamental research work which led to the firm's entry into the plastics field. He was a well known authority both on polyester resins and on styrene resin-nitrile rubber blends.

MEETINGS

Nov. 26-Dec. 1—Chemical Industries, 23rd Exposition, Grand Central Palace, New York, N. Y.

Dec. 2-5—American Institute of Chemical Engineers, Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

Dec. 13-14—Society of the Plastics Industry, Third Film, Sheeting & Coated Fabrics Div. Conference, Hotel Commodore, New York, N. Y.

Jan. 14-17—Plant Maintenance Show, Convention Hall, Philadelphia, Pa.

Feb. 21-22—Society of the Plastics Industry, (Canada) Ltd., 10th Annual Conference, Royal York Hotel, Toronto.

Mar. 3-7—American Society for Testing Materials, Spring Meeting and Committee Week, Hotel Statler, Cleveland, Ohio.

Mar. 11-14—Society of the Plastics Industry, Fifth National Plastics Exposition, Convention Hall, Philadelphia, Pa.

Mar. 16-19—American Institute of Chemical Engineers, Atlanta Biltmore Hotel, Atlanta, Ga.

Mar. 22-April 6—Chicago International Trade Fair, Navy Pier, Chicago, Ill.

April 9-11—Society of the Plastics Industry, Seventh Annual Technical Session, Reinforced Plastics Div., Edgewater Beach Hotel, Chicago, Ill.

June 23-27—American Society for Testing Materials, 50th Anniversary and Annual Meeting, Hotels Statler and New Yorker, New York, N. Y.

S.P.E. Meeting

Jan. 16-18—8th Annual National Technical Conference, Edgewater Beach Hotel, Chicago, Ill.

CLASSIFIED ADVERTISEMENTS

MODERN PLASTICS reserves the right to accept, reject or censor classified copy.

EMPLOYMENT • BUSINESS OPPORTUNITIES • EQUIPMENT (used or resale only)

MACHINERY and EQUIPMENT FOR SALE

FOR SALE: Quick delivery Rubber and Plastic Equipment. Farrel 18" x 45", 16" x 48", and 15" x 36", 2 roll rubber mills. New 6" x 12" Lab. Mixing Mills and Calenders. Vaughn 60" Mill and 125 HP motor. Royle #½ & #2 extruders, also other sizes. 180 ton F.B. Molding Press, 20" x 20". Francis 175 tons 24" x 18". W.S. 115 ton 24" x 24". Also presses Lab. to 1500 tons from 12" x 12" to 48" x 48". Hydr. Oil Pumps Watson Stillman Hor. 4 plgr. 1¼" & 2½ x 4" H&L Pressure pump. HPM 10 GPM 2700 lbs. Elmes Hor. 4 Plgr. 5&8 GPM 4500 lbs. & 5500 lbs. Hydr. Accumulators. Stokes Automatic Molding Presses. Rotary & Single punch Tablet Machines ½" to 3". Reed-Prentice 8 oz. Injection Molding Machine late 1947, also other sizes. Baker Perkins jacketed mixers 200 & 5 gal. Impregnating units. Ball & Jewell #0 & Loominster #0 Plastic Grinders. Mikro Pulverizers 2 DH, 10 HP & other sizes. Heavy duty mixers, grinders, pulverizers, gas boilers etc. Partial listing. We buy your surplus machinery. Stein Equipment Co., 50 West Street, New York 6, N.Y. Worth 2-5745.

SAVE WITH GUARANTEED REBUILT EQUIPMENT — HYDRAULIC PRESSES, 24" x 24", 18" ram 315 tons; 24" x 56", 450 ton multiple opening; 24" x 24", 16" ram, 250 tons; 24" x 24", 12" ram, 170 tons; 24" x 42", 2—12" rams, 240 tons, 42" x 42", 16" ram, 250 tons; 36" x 36", 12" ram, 141 tons; 20" x 18", 10" ram 118 tons; 20" x 20", 10" ram, 118 tons; 19" x 24", 10" ram, 75 tons; 22' x 18', 8' ram, 75 tons; 27" x 21", 8" ram, 75 tons; 15" x 15", 8" ram, 75 tons; 12" x 12" 7½" ram, 60 tons; 12" x 12", 6½" ram, 50 tons; 8" x 9½", 4½" rams, 20 tons; 10" x 16", 3½" rams, 12 tons; Laboratory Presses; 10 ton Carver 4" x 4", Watson Stillman 30 ton, 6" x 6"; Laboratory Mills and Calenders (NEW) M. D.; THROPP Mill 16" x 40" M. D.; NEW DUAL PUMPING UNITS, all sizes; Extruders; Royle Rubber #2, Royle Plastic #1, PREFORM PRESSES, Stokes T. Colton, 5½ T and Stokes DD84 with Reeves Drives, also Mixers, Vulcanizers, Accumulators, etc. Universal Hydraulic Machinery Company, 385 Hudson Street, New York City 13, N. Y.

We handle hydraulic presses, pumps, and power units of all sizes. Write us your requirements and we will try to help you. We find it impossible to list our equipment in this classified column due to the fact that the equipment is sold before ad is published. For those who seek action look in the New York Times under the Machinery and Tool Column for our regular Sunday Special. Hydraulic Sal-Press, Inc., 384-90 Warren Street, Brooklyn 2, N.Y. MAin 4-7847

FOR SALE: 50 Ton Stokes Presses & Pump, 200 Ton W.S. Hobbing PRESS, 300 Ton W.S. PRESS 24 x 20 Platen, 175 Ton H.P.M. PRESS 30 x 30 Platen, 150 Ton Farrel PRESS 30 x 30 Elec. Platen, 140 Ton W.S. PRESS 23 x 17 Platens, 85 Ton Stewart Boiling PRESS 20 x 20 Platen, 50 Ton Elmes PRESS with 18 x 18 Elec. Platen, 75 Ton W.S. PRESS 15 x 15 Platen, 75 Ton Adamson PRESS 20 x 20 Platens, Laboratory presses, Accumulators, Piston and Oil Pumps. AARON MACHINERY CO., INC. 45 Crosby St., N.Y.C.

FOR SALE: 12 ounce Lester Injection Molding Machine with spare cylinder. Excellent running condition. Can be seen in operation. Reply Box 1300, Modern Plastics.

FOR SALE: Complete wood flour mill. Capacity 10 tons per 24 hours, using nearby supply of pine and poplar. For further particulars address Box 1274, Modern Plastics.

FOR SALE: Thermex Preheater, Model 2P; Airtronics Preheater, Model D E; Airtronics Preheater, Model C B. Like new. AARON MACHINERY CO., INC. WOrth 4-8232, 45 Crosby St., New York 12, N. Y.

FOR SALE: 1 Stokes DD2 Rotary Tablet Machine, Vari-Speed Drive and motor; 1—Farrel 16" x 42" Rubber Mill complete with drive and 75 H.P. Motor; 2—Ball & Jewel #2 Rotary Cutters, 50 H.P. Motors. Also Grinders, Extruders, Compression and Injection Molding Presses, Mixers, etc. Send us your inquiries. Consolidated Products Co., 13-14 Park Row, New York 38, New York.

FILM AND SHEETING EMBOSSER: Complete 60" embossing unit with driven unroll, radiant heating section, pneumatic embossing rolls, cooling drum and surface rewind. Price $13,500 including Taffeta engraved roll. Reply Box 1264, Modern Plastics.

FOR SALE: One 6 Ton Automatic Compression Molding Machine, with automatic 3 cavity feeder and fast closure for the alkyd molding compounds, $2,000.00 F.O.B., Toledo, Ohio. This Press was pilot model for 15 and 30 Ton Baker Automatics. Contact A. B. Williams, 2025 Parkwood Avenue, Toledo, Ohio. May be seen at Baker Brothers Inc., Toledo, Ohio.

1/32 oz.	Impco (1946)
1/32 oz.	Reed-Prentice (1950)
1/16 oz.	Reed-Prentice (1945)
1/16 oz.	Impco (1947)
1/12 oz.	Lester (1946)
2/12 oz.	De Mattia's (1946-47)
2/8 oz.	Lester (1947)
4/8 oz.	Reed-Prentice (1945-1947)
1/8 oz.	Loominster (1946)
1/8 oz.	Watson-Stillman (1946)
3/6 oz.	Lesters (1 new—others 1944 to '46)
4/4 oz.	Lesters (1942 to '46)
1/2 oz.	De Mattia (1942)

1-64" Huether Slitter, Model H. D. D. (New)
1-Ball & Jewell Slitting & Chapping. 9" x ⅛ cubes (1950) 1-Hartig 4-½" Extruder (Factory rebuilt) new 1945. 1-Adamson Embossing Calender, 2 roll 11" x 22" x 63" (new)

WANTED: Compression Presses (all styles & sizes). Preform Presses and extruders. Will exchange for above equipment or buy outright. Reply to R. A. Peterson Co., P. O. Box # 305 Springfield, Mass. Phone Springfield 37903. ..

FOR SALE: New Equipment never used still crated 1—ERIE 393 Ton Moulding Press, 3 Platen, cures 2 Moulds at one time. 1—15 H.P. Hydraulic Pump and Greer Accumulator. Artwire Creations, Inc., Suffern, N. Y.

FOR SALE: Two H.P.M. Injection Molding Machines, Built 1946. 9-oz., $7,500.00, $3,000.00 down, balance terms. 4-oz., $5,000.00, $2,000.00 down. Both machines operating daily. Jim Robbins Company, Detroit, Hazel Park, Michigan. Phone, Jordan 4-4634.

FOR SALE: 2—Watson Continuous Takeup Machines with pneumatic control system — dual 20" dia reels, 17" wide—excellent condition. Reply Box 1279, Modern Plastics.

FOR SALE: (1) 12 E. Watson-Stillman injection molding Machine, as good as new. Excellent Working condition. Reply Box 1298, Modern Plastics.

FOR SALE: 6 Rotary Pellet Presses: Kux model 25 (21 punch and 25 punch); Stokes D-3 and D-4, Read Co. 250 gal. heavy duty double arm sigma blade jacketed mixers. PERRY EQUIPMENT CORP.; 1429 N. 6th Street, Phila. 22, Pa.

FOR SALE: Used Lester 2-B-44-6 ounce machine. Recently reconditioned and reward. Complete with extra cylinder, Ross oil cooler, instruments, booster timer control. Excellent condition. Immediate delivery. $6500. NYLON MOLDED PRODUCTS CORP., GARRETTSVILLE, OHIO.

AT BARGAIN PRICES

Colton 2 and 3 RP Rotary Tablet Machines.
Mikro 1SH, 2TH, 3TH, 4TH Pulverizers; Jay Bee and Schutz O'Neill Mills.
Baker Perkins & Readco Heavy Duty Steam Jacketed, Double Arm 50, 100, 150 gal. Mixers.
Baker Perkins 150 gal. D. A. Unidor Jacketed Mixer.
Baker Perkins 100 gal. D. A. Vacuum Mixers.
J. H. Day 75 & 55 gal. Imperial and Cincinnatus D. A. Jacketed, Sigma Blade Mixers.
Day and Ross Pony Mixers 8, 15 gal. caps.
Hobart & Read Vertical Mixers, from 15 to 120 quart, with removable bowls.
Day & Robinson 100 up to 4000 lbs. Dry Powder Mixers.
Package Machy. FA, FA2, Miller, Hayssen 3-7, Scandia Auto. Cellophane Wrappers.
This is only a partial list. Over 5000 machines in stock—rebuilt and guaranteed —available at tremendous savings.
UNION STANDARD EQUIPMENT CO.
318-322 Lafayette Street
New York 12, N. Y.

INJECTION MOLDING MACHINES

1-Oz. Van Dorn, Mod H200, 1947..$OFFERS.
2-Oz. Loominster, semi-auto. 220/4..$OFFERS.
2-Oz. H.P.M. new '39; Mod 10-A, good..$3500.
4-Oz. H.P.M. new '39, Mod 10-A.....$5600.
6-Oz. REED, W&S 1942 up, Mod 10-D..$6500up.
8-Oz. REEDs, several avail '42up....$8000up.
8-Oz. DeMattias (6 avail.); good cond..$8000ea.
8-Oz. Loominster, ser. #146cl. good...$8500.
8-Oz. Lesters 1947; good cond.....$11000up.
9-Oz. H.P.M. Mod. 200-89, good cond....$5950.
12-Oz. DeMattias (4); 1946, good con...$8500ea.
16-Oz. Impco, Reeds, HPM, W&S;..$15000up.
22-Oz. Reed, 1946; Mod 10-H, (2)....$19500up.
32-Oz. Impco & Reed, 1949 and up...$26000up.
48-80-Oz. Impco injector only, new..$11900up.

HYDRAULIC COMPRESSION PRESSES

450 T. H.P.M. new '46; w/ turbo....$OFFERS.
350 T. Southwark, 16"; 24x24" platens..$2975.
350 T. H.P.M. '46; self-contained.....$9500.
275 T. W&S, platens 24x55; 8", stroke..$2975.
240 T. Hardinge Platen 24x30", 12"st...$7000.
225 T. W&S angle type; 18x18 14x22....$4000.
200 T. Farrel 14" ram, 24x24 platens....$1750.
200 T. Standard Platens 44x44"....$OFFERS.
170 T. Burroughs Transfer 14" stroke..$1850ea.
75 T. Standard '40 vertical & horiz.....$1950.
63 T. Laminating, self-contained.....$1450.
50 T. W&S & Johnson, others .....$650up.

MISCELLANEOUS

Vickers Hyd. Pump Mod V135 17.....$750.
Phenolic Powder plant 200,000# per mo. .....$OFFERS.
Huskey #6 Marking machine .....$950.
Two (2) 16 x 42 Rubber Mills.....$OFFERS.
One (1) 16 x 36 Rubber Mill.....$OFFERS.
National Extruder 2½".....$6500.
Hartig #500 class 2½".....$3450.
Farrel Two roll Mill 16" x 42, ...$3975.
Farrel 16" x 40" horizontal 3 roll .....$5625.
Farrel 14" x 30" endcap rubber mill....$3950.
Farrel 16" x 40" endcap rubber mill....$3125.
Wilson Snyder Pump 3200# 40HP.....$4000.
Federal Megatherm Induc. tablet curing machines. .....$OFFERS.
Grunder Hammer Mill type plastic grndr $1200.

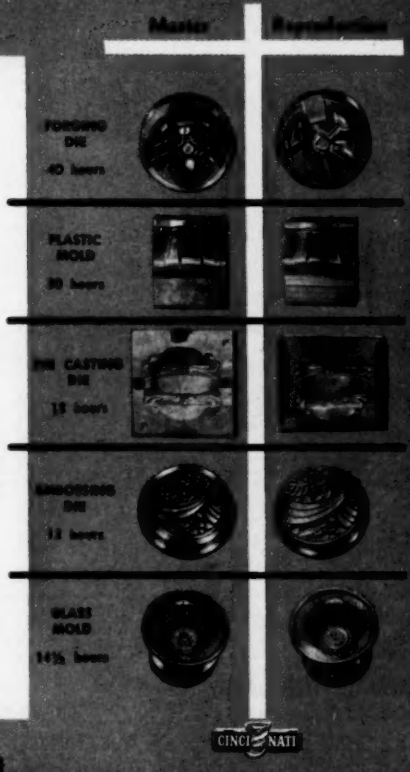
E. J. McCallum, Jr.
EVEREADY SUPPLY CO.
805 Housatonic Ave., 4-9471
Bridgeport, Connecticut

(Continued on page 218)

Your best buy for small- to medium-sized dies, molds, holes, metal patterns, etc.—CINCINNATI 8" x 18" Tool and Die Miller. Complete descriptions and illustrations in new catalog No. M-1731.

TYPICAL

Dies and Molds Milled on Cincinnati 8" x 18" TOOL AND DIE MILLER



Do you make dies and molds like those illustrated here? All are examples of the low-cost work performed by CINCINNATI 8" x 18" Tool and Die Milling Machines. Note the perfect likeness of the reproduction to the master; *they were not hand finished prior to photographing, nor were the photos retouched.* Features of the 8" x 18" which are responsible for the excellence and low cost of this type of work include sensitive, light pressure automatic depth tracing unit . . . double swivel adjustment for spindle head . . . full 8" x 18" cutting area in one setting . . . antifriction feed screws and nuts. Complete data may be obtained by writing for a copy of our new catalog No. M-1731.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES
BROACHING MACHINES • FLAME HARDENING MACHINES
[illegible] • CUTTING FLUID

CLASSIFIED ADVERTISING

(Continued from page 216)

FOR SALE: 8 oz. Watson-Stillman and 2 oz. DeMattia in good condition. Can be seen in operation at Detroit Plastic Engineering Co. 7047 East Eight Mile Rd., Base Line, Mich. Phone Detroit Jefferson 6-0222.

FOR SALE: Injection Presses 4 oz. HPM, 8 & 12 oz. Watson, 22 oz. Lester, 22 oz. Impco, 2 oz. DeMattia, 1 oz. VanDorn. Extruders: 1—BenchLab, 1—2½" NRM.—1—Sheet Die 51" for NRM Extruder & takeup unit. 1—Johnstone 42" Slitting & Rewinding mach. Scrap-grinders. 4—Mikella Infrared Dryers. Compression Presses: 50, 250 & 600 tons. 2—3KW Electronic Preheaters. 1—250 ton, 10 Plat. 36" x 28" Laminating Press. Preformpresses: Stokes R. Kux No 60, 65 B. 1—Nash Rotary Edger.—3—Embossing Calenders 61" wide. 1—Sheridan Embossing Press. 1—Patterson Stainl. Steel 81½ cuft. Conical Blender. 1—7½ HP Vacuum pump. Justin Zenner, 823 W. Waveland Ave., Chicago 13, Ill.

FOR SALE: 248-2 Singer Electronic Bonding Machine and attachments. Maimin Cyclamatik Cutting Machine. Automatic Sharpener. Lubricating attachment, etc. Both in new condition, used less than 4 months. Will sell singly or together. Open for offer. Will ship on trial at your expense if well rated. Contact J. H. Brooks, 405 Adams Ave., Evansville, Indiana.

MACHINERY and EQUIPMENT WANTED

WANTED: One Hydraulic Press 50 to 200 tons High-Speed designed for Fiber-glas molding Large Bed. Also one smaller press electric oven and Fiber-glass preforming machine. Reply Box 1266, Modern Plastics.

WANTED. Pelleting preforming machine. Must be automatic. Capable of producing between 5 and 25 7" diameter pellets per minute. Approximately 100 to 125 ton pressure. Reply Box 1267, Modern Plastics.

WANTED: To Expedite Production—Rubber Making Machinery including Banbury Mixers, Heavy Duty Mixers, Calendars, Rubber Rolls & Mixers, Extruders, Grinders & Cutters, Hydraulic Equipment, Rotary and Vacuum Shelf Dryers, Injection Molding Machines. Will consider a set up plant now operating or shut down. When offering give full particulars. P.O. Box 1351, Church Street Sta., New York 8, N. Y.

WANTED: Modern 6" x 12" two roll mill suitable for rubber and plastics. Also 6" x 12" four roll calender. Reply Box 1281, Modern Plastics.

WANTED: Stainless steel water-jacketed Ball Mill. Medium size. Give dimensions, price and location. Reply Box 1290, Modern Plastics.

MATERIALS FOR SALE

FOR SALE: A supply of 3/8" diameter Plexiglas rods in original wrapping. CAROLINA PLASTICS COMPANY, 2801 N. TRYON ST., CHARLOTTE, N. C.

LUCITE—PLEXIGLASS—GLACITE SHEETS —CAST RODS Always in stock—we deliver. PLASTICS GLASS CORP., 33 Ave. P., Newark 5, N. J., Mu 7-6477.

FOR SALE: Grade Le Phenolic Sheet Slugs 2—½" wide x 3" long 700 # .125 thick 700 # .031 thick 700 # 3/32 thick. Samples furnished on request, Price: Best Offer, Reply Box 1272, Modern Plastics.

FOR SALE: Acrylic (Lucite, Plexiglas, etc.) Scrap crushed or uncrushed, export packed. Regular supply. Also off-cuts and salvage material. Reply Box 1275, Modern Plastics.

FOR SALE: 6000# Koppers special brown, virgin polystyrene. Mill price. Detroit Plastic Engineering Co., 7047 East Eight Mile Road, Base Line, Mich. Phone Detroit Jefferson 6-0222.

FOR SALE: Regular monthly quantities of vinyl scrap and polyethylene scrap. Guaranteed good quality. Reply Box 1280, Modern Plastics.

BUY—BARTER—SELL: Phenol—Phthalic—Maleic—Glycols—Titaniums—Zinc Oxides—Hydrosulfite — Bichromates — Ethanolamines — Pine Oil—Benzol—Dyes—Colors, etc. CHEMICAL SERVICE CORP., 90-04 Beaver St., New York 5, N.Y.

WE BUY and SELL all types of plastic scrap and virgin resins: Vinyl, Butyrate, Polyethylene, Polystyrene, Acrylic, etc. We also deal in vinyl remnants. The Regent Co., 394 Broadway, New York 13, N.Y. WO 4-0362 - 0366.

MATERIALS WANTED

WANTED: PLASTIC Scrap or Rejects in any form. Acetate Butyrate, Polystyrene, Acrylic, Vinyl Polyethylene, etc. Also wanted surplus lots of phenolic and urea molding materials. Custom grinding, magnetizing and compounding. Reply Box 1262, Modern Plastics.

WANTED: PLASTIC SCRAP or REJECTS in any form: Cellulose Acetate, Butyrate, Polyethylene, Polystyrene, Vinyl, Acrylic and Ethyl Cellulose. Reply Box 1263, Modern Plastics.

WANTED: Plastic scrap & rejects such as Rigid Vinyls, Polyethylene, Cellulose Acetate, Acrylics, Polystyrene, Ethyl Cellulose, Butyrate, etc. Also custom grinding magnetizing, cleaning and reprocessing of your own plastic scrap. Reply Claude P. Bamberger, Inc., 152 Centre Street, Brooklyn 31, N. Y. Telephone Maine 5-5553.

SURPLUS CHEMICALS BOUGHT: Turn your obsolete and excess inventories of chemicals into useful cash. Pyramid service is prompt, informative, and helpful. Pyramid prices are higher. WRITE — WIRE — OR PHONE US AT RITTENHOUSE 6-6592. PYRAMID CHEMICAL COMPANY, 1343 Arch St., Phila. 7, Pa.

WANTED: Plastic Scrap, Rigid Vinyl, Cellulose Acetate, Polystyrene, Polyethylene, Butyrate, Custom grinding, magnetizing, compounding, and straining of contaminated plastics. Franklin Jeffrey Corporation, 1671 McDonald Avenue, Brooklyn, N. Y. ES 5-7943.

Polyethylene Scrap—CAN USE ALL KINDS. Par Co., 830 Monroe St., Hoboken, N. J. Phone WHitehall 3-5793

All classified advertisements payable in advance of publication

Up to 60 words . $ 7.50	Up to 120 words $15.00	Up to 180 words $22.50
Up to 60 words (boxed) $15.00	Up to 120 words (boxed) $30.00	Up to 180 words (boxed) $45.00

For further information address Classified Advertising Department, Modern Plastics, 575 Madison Ave., New York 22, N.Y.

MOLDS

MOLD WANTED for injection molding. We will buy one mold or a complete line or series of molds for finished resalable items. Housewares, toys, novelties, etc. Will also buy molds for industrial parts such as handles, knobs, drawer pulls, gears. All items for resale in U. S. A. Send detailed information to Victory Manufacturing Company, 1722 W. Arcade Place, Chicago 12, Illinois.

WANTED: for England, France, successfully used injection and compression moulds for technical novelties, housewares, toys and department store merchandise. Purchase or royalty. Give technical description and illustration or samples of article. Returning Europe beginning January. Reply Box 1292, Modern Plastics.

WANTED: Moulds for dolls with movable arms, legs and heads; sizes 8 inches up. Also interested other toys & plastic novelty moulds for South American Moulder. Reply Box 1273, Modern Plastics.

FOR SALE: "Imitation" Bowling Ball Mold—Phenolic Bowling Ball used as radio housing. Suitable for men's gift container, advertising displays, etc. 8" dia. — 2 halves — total parts weight 20 oz. The Spartan Co., 2900 So. Emerson Ave., Minneapolis 8, Minnesota.

WILL SELL OR LEASE INJECTION MOLDS FOR KING SIZE PLASTIC CAKE COVER. Reply Box 1284, Modern Plastics.

FOR SALE: A complete line of 8 comb molds now in operation for 4 oz. or bigger presses. Reply Box 1295, Modern Plastics.

Toy Molds Wanted, New or Used, Miniature Cups, Saucers, Dishes, and Related Items. Reply Box 1299, Modern Plastics.

SITUATIONS WANTED

Injection Molding Superintendent desires to make change, experience, toolroom supervisor, new product developing, mold design, estimating molds, molding machine building, and maintenance. Familiar with molding techniques and finishing operations. Reply Box 1289, Modern Plastics.

ENGINEER: B.Ch.E.—Polyethylene film extrusion background. Have set up machinery and supervised production. Proven production record on various size extruders, using virgin resin and straight scrap. Designed auxiliary equipment. Have done some work on extruding inflated tubing. Limited sales experience. Presently employed. Married veteran. Willing to relocate. Reply Box 1293, Modern Plastics.

VINYL CHEMIST, extensive experience in calendering, printing, heat sealing, embossing and formulating. Background in color matching of both inks and film. Technical sales liaison. At present with leading fabricator and converter of film and sheeting. Have contacts both buying and selling. Desire permanent position with leading manufacturer. Reply Box 1265, Modern Plastics.

TOOLMAKER, Some experience on molds, wishes to contact molders, any part of U.S. At present employed in East, with custom molder. Previous experience mostly on metal stamping dies. Have complete tools, prefer mold-making, and seek opportunity in preference to top wages. Free to travel, or move to any part of country. Reply Box 1291, Modern Plastics.

Industrial Engineer, 25, single, not subject to draft. Experience: 2 years in injection molding and compounding of cellulose acetate by extrusion method. Desire connection with well established plastic concern. Reply Box 1277, Modern Plastics.

(Continued on page 220)

CLASSIFIED ADVERTISING

(*Continued from page 218*)

HELP WANTED

Plastic mold designer wanted—familiar with all phases of injection molding, capable of engineering and designing products and molds, estimating production and mold cost for a large manufacturing company. When replying, please state all qualifications, stating age, experience and education. Reply Box 1285, Modern Plastics.

Plastic mold designer wanted, with thorough knowledge of tool shops located in the east and middle west, to purchase and expedite delivery on a continuous, large, mold-building program. When replying, please state all qualifications, giving age, experience and education. Reply Box 1286, Modern Plastics.

We require the services of an experienced plastic purchasing man who has a good knowledge of continuous sources for secondary and reground plastic materials. Send personal data and background summary to Box 1287, Modern Plastics.

SALESMAN: Experienced, able to read blueprints, to call on industrial trade in Metropolitan New York area for old plastic molder. State full particulars, salary. Reply Box 1293, Modern Plastics.

Man experienced in molding and assembling plastic parts. Capable of setting up new plastic plant and training help. When replying, please state all qualifications, giving age, experience, and education. Reply Box 1288, Modern Plastics.

COATER ENGINEER OR FOREMAN—Excellent opportunity for experienced man to assume responsibility over new department being set up in old, established firm. Experience necessary with organisols and plastisols. Reply stating all personal qualifications and business experience. All replies confidential. Reply Box 1270, Modern Plastics.

Plant Superintendent required by small Midwestern compression molding and laminating plant. Must have complete knowledge of compression molding, impregnation of cloth, paper, etc., as well as painting of finished products. Must have knowledge of labor relations and all matters pertaining to production. This is an excellent opportunity with a growing company. Reply to Box 1296, Modern Plastics.

WANTED: Graduate engineer with approximately five years experience in testing or application of plastic materials, primarily thermosetting and thermoplastic molding materials and laminates, having a good knowledge of their physical properties. Position in Plastics Laboratory of large New York State manufacturer of precision electro-mechanical devices. Send full details of education and industrial experience. Reply Box 1271, Modern Plastics.

Mid-Western Custom Injection Molder requires capable sales representation. Please address inquiries to Box 1294, Modern Plastics.

Sales Representatives Wanted: Leading manufacturer of low-pressure laminating and casting resins is interested in obtaining part-time services of technically trained representatives now calling on laminators, molders or general industry in New England, the Southeast, South, Northwest and on the Pacific Coast. Protected territories, commission basis with large profit potential to active men. Reply Box 1282, Modern Plastics.

MISCELLANEOUS

PLASTICS PLANT FOR SALE: Injection & Compression. Medium size. Suitable for Plastics Engineers with capital or as a division of larger concern with proprietary requirements of plastics. Good central Midwest location. Reasonable lease of building. Answers treated confidentially. Reply Box 1276, Modern Plastics.

PATENT PENDING ON FLOWER POT. Available on royalty basis to manufacturers interested in taking over the production, promotion and distribution. Reply Box 1269, Modern Plastics.

Individual seeks manufacturer with facilities for producing molded plastic combination fisherman's creel and tackle box on which a patent has been issued. Requires injection molding. Have model and working plans. Interested in royalty basis or other satisfactory arrangement. Reply Box 1278, Modern Plastics.

Willing to establish injection, compression or extrusion plant for organization or company that can supply year round molding work or will invest in established plastic plant and will also take active part. Reply Box 1268, Modern Plastics.

FOR SALE: Injection Moulding Plant—Consisting of ½ oz. Van Dorn, 1—Cumberland Grinder Model # 0. All equipment brand new. Approximately 2500 lbs. of Styrene. Reply Box 1297, Modern Plastics or call LO 3-1336.

Sales representative, New York, covering major 5c. to $1. Chain Stores and Jobbers, desires to contact molders of plastic Specialties, Toys, Housewares, Notions, Novelties, etc. Have over 20 years experience and extensive following. If you have the items, I can give you quick action and volume sales. Commission. Reply Box 1269, Modern Plastics.

INDEX OF ADVERTISERS

DECEMBER 1951

(Continued on page 224)

"on target"

Your customers in the plastics field are the target. And the "Show" issue of MODERN PLASTICS is aimed to hit them when they are at their "buyingest"... before, during and after the Fifth National Plastics Exposition to be held in Philadelphia, March 11 - 14.

If you are determined to capitalize fully on the sales potentialities of the Show, key your advertising to it in the March '52 issue of MODERN PLASTICS.

Favored advertising positions are allocated "first come, first served." A special brochure explains the impact this issue will create, describes its special editorial features, and gives space rates and mechanical requirements. For your copy, write to Advertising Department, MODERN PLASTICS, 575 Madison Avenue, New York 22, N.Y.

remember: to sell the plastics market, tell your story in the march '52, "show" issue

MODERN PLASTICS **GIANT "SHOW" ISSUE** (MARCH '52)

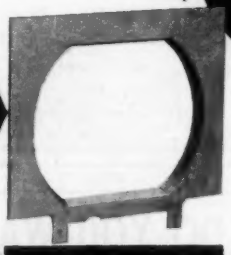
INDEX OF ADVERTISERS

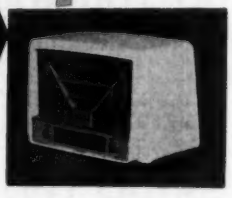
(Continued from page 222)

MODERN PLASTICS

575 MADISON AVENUE • NEW YORK 22, N.Y.

WMP customers are always right in line for plastic success





You could look forever for a custom injection moulder more customer conscious than Worcester Moulded Plastics Company. Plastically speaking, your product becomes our product. For all practical purposes, since we neither mould nor market any item of our own, you can consider Worcester Moulded Plastics YOUR own plastics department. Our experience teamed with our extensive facilities will put you right in line for a plastic success.

From repeated experience, we know that a visit to our plant will be the most satisfactory means of proving to you what we have done for others, are now doing, and can do for you. We will gladly send our plane to bring you to our plant.

wmp

Custom Injection Moulding

WORCESTER MOULDED PLASTICS CO.

14 HYGEIA STREET, WORCESTER 8, MASS.

17 East 42nd St., New York 17, N. Y.

Gaskets by Johnson Plastic Corp., Chagrin Falls, Ohio

HERE'S another spot where versatile VINYLITE Plastics outperform all other older materials—in the lid seals of washing machines.

Beaten, battered, constantly exposed to water and to chemical detergents, these easily extruded seals of VINYLITE Brand elastomeric materials last a lifetime!

Manufacturers find that their high flexibility simplifies handling, speeds production, saves money. Salespeople make sales points of their color and durability. Housewives welcome their complete freedom from stretching, cracking, softening. Practically indestructible, they resist detergents, soaps, water, acid and alkali solutions, oils, greases, dirt, mildew, age.

You'll find these materials in the door gaskets of leading refrigerators, in lightweight, quality garden hose, in moisture- and chemical-resistant wire insulation. They're the preferred material of many manufacturers for extruded belts, welting, intravenous tubing, and molded light plugs, distributor cap nipples, vacuum cleaner bumpers, hair curlers, and a multitude of other products.

Why not find out how they can lower your costs, speed assembly, lengthen product life? Write today for the free booklet, "VINYLITE Resins and Plastics—Extrusion and Molding Materials." Address Dept. LH-7.

Vinylite
BRAND
PLASTICS

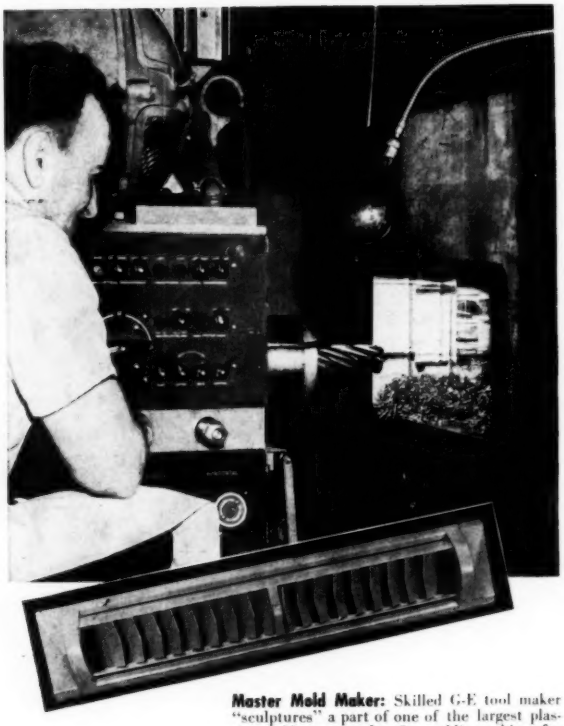
TRADE MARK

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N.Y.

One of a series of messages to design engineers on the advantages of General Electric's specialized molding service in defense and industrial production.

Specialized MOLDING SERVICE

. . . FOR BETTER-LOOKING, EASIER-MADE AIR CONDITIONING UNITS



Master Mold Maker: Skilled G-E tool maker "sculptures" a part of one of the largest plastics molds ever made—for molding cabinet for York air conditioner.

Shoots the Breeze: Two-foot G-E-molded plastics grille, delivered to York Corporation complete with adjustable louvers and hardware, saves valuable installation time.

● The unexcelled General Electric facilities for producing large molded plastics parts on a mass-production basis are particularly important to the air conditioning industry.

For example, General Electric recently built a huge 6-ton mold—one of the country's largest—to mass-produce complete cabinets for York window-type air conditioners. General Electric's ability to design and build such large molds gives product designers new freedom in the use of rugged, attractive plastics cabinets and other large plastics parts of economical, one-piece construction.

Also molded for York Corporation by G.E.: a two-foot-long rotary grille for room coolers. To eliminate assembly work, this intricate part is delivered complete with adjustable louvers and hardware—is quickly screw-fastened into position.

G.E.'s plastics molding service is specially equipped to serve industries like these: *Television & Radio, Air Conditioning, Automotive, Refrigerator, Washing Machine, Electrical Apparatus.* For details on *your industry*, write to: Section B-5, Chemical Division, General Electric Company, Pittsfield, Mass.

MOLDED PLASTICS FOR DEFENSE

Government contractors can depend on General Electric's Plastics molding service for a great variety of plastics parts. The broad scope of this service is indicated by G-E compression equipment ranging in capacities from 3 to 36 inches; injection equipment that can handle shots of from 1-1/2 to 208 ounces.

You can put your confidence in

GENERAL ELECTRIC